FOCUSED FEASIBILITY STUDY

OPERABLE UNIT 2
FINAL REMEDY:
FILL AND SHALLOW GROUNDWATER
216 Paterson Plank Road Site
Carlstadt, New Jersey

Prepared for:

216 Paterson Plank Road
Cooperating PRP Group

Prepared by:

Golder Associates
Philadelphia USA

PROJECT No. 943-6222 **APRIL, 2001**

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April 26, 2001

Project No.: 943-6222

Chief, New Jersey Compliance Branch
Emergency and Remedial Response Division
U.S. Environmental Protection Agency, Region II
290 Broadway
New York, NY 10007-1866

Attn.: Mr. Jon Gorin, Remedial Project Manager

RE: 216 PATERSON PLANK ROAD, CARLSTADT, NJ
FOCUSED FEASIBILITY STUDY, OPERABLE UNIT 2
FINAL REMEDY: FILL AND SHALLOW GROUNDWATER

Gentlemen:

On behalf of the 216 Paterson Plank Road Cooperating PRP Group, we enclose two copies of the above Report. Two copies have also been provided to the New Jersey Department of Environmental Protection under separate cover.

This report has been revised and expanded from the version submitted in July 2000 and we believe that all the issues discussed during our April 3 meeting with EPA have been addressed.

If any questions arise during your review of the report, please do not hesitate to contact me.

Very truly yours,

GOLDER ASSOCIATES INC.

P. Stephen Finn, C.Eng.
Facility Coordinator

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cc: Chief, Bureau of Federal Case Management
N.J. Department of Environmental Protection
Attn: Riché Outlaw, Case Manager

Warren L. Warren, Esq., Drinker, Biddle & Reath
Cooperating PRP Group Technical and Executive Committees

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1.0 INTRODUCTION

1.1 Purpose

On behalf of the 216 Paterson Plank Road Cooperating PRP Group (Group), Golder Associates Inc. (Golder Associates) submits this Focused Feasibility Study Report (FFS) on the final remedial action for fill and shallow groundwater (i.e., above the clay layer) at the 216 Paterson Plank Road Site (Site) in Carlstadt, New Jersey. This FFS was performed at the request of United States Environmental Protection Agency (USEPA) and in accordance with the previously approved Focused Feasibility Study Work Plan (Work Plan; Golder Associates, 1995) and the Focused Feasibility Study Investigation Work Plan (FFSI Work Plan; Golder Associates, 1997a). Administratively, the work was conducted pursuant to the additional work provisions of an Administrative Order on Consent (Index No. CERCLA II-50114) dated September 30, 1985 (RI/FS Order) entered by a number of Potentially Responsible Parties (PRPs). On September 23, 1985, a group of thirty-one other PRPs was issued a Unilateral Order (Index No. II-CERCLA-60102) that mandated that they fully participate in the efforts of, and cooperate with, those parties who entered the Administrative Order.

The purpose of this FFS is to provide the basis for selection of the remedy for Operable Unit 2 (OU-2) which is defined by USEPA as the final remedy for the fill and shallow groundwater above the clay layer underlying the Site. These media were previously addressed via an interim remedy referred to as the First Operable Unit (FOU). Additional work is being conducted concurrently to identify the nature and extent of contamination in deeper groundwater. Deep groundwater will be addressed as part of the Operable Unit 3 (OU-3) in a subsequent remedy selection process.

This FFS summarizes the previous work conducted at the Site, provides an evaluation of alternatives as previously presented to USEPA and the New Jersey Department of Environmental Protection (the Agencies) together with an evaluation of an additional sludge area removal alternative as requested by the USEPA in March 2001. Detailed analyses are provided in accordance with the criteria established in the National Contingency Plan (NCP).

1.2 Overview

The 6-acre 216 Paterson Plank Road Site is a former chemical recycling and waste processing facility that ceased operation in 1980 and was placed on USEPA's National Priorities List (NPL) in 1983. The property is bordered to the southwest by Paterson Plank Road, to the northwest by Gotham Parkway, to the southeast by a trucking company, and to the northeast by Peach Island

Creek as shown on Figure 1. A Remedial Investigation (RI) was initiated in 1987 leading to a USEPA Record of Decision (ROD) in 1990 requiring the implementation of an Interim Remedy (the FOU). The Interim Remedy was conducted in 1991-1992 and effectively mitigated the principal threats posed by the Site. The present FFS is being conducted at the request of USEPA to provide a basis for selection of a final remedy for the fill and groundwater above the clay layer.

In accordance with the approved Work Plan, Golder Associates completed Phase I of the FFS, Development of Remedial Alternatives. On January 25, 1996, Group representatives and Golder Associates met with the Agencies and presented the Phase I results that included a summary of existing data, recommended remedial alternatives for consideration in Phase II of the FFS (Detailed Evaluation of Alternatives), and data gaps required to be filled to complete the detailed evaluation.

The subsequent FFSI Work Plan presented a detailed evaluation of the nature of the fill and ex-situ remedial alternatives. The FFSI Work Plan concluded that Site-wide ex-situ treatment alternatives should be eliminated from further consideration in the FFS and recommended that in-situ treatment alternatives be evaluated with particular reference to a sludge area identified in the vicinity of the RI boring B-1 located in the eastern part of the Site. The highest concentrations of polychlorinated biphenyls (PCBs) and chlorinated volatile organic compounds (VOCs) detected at the Site were associated with the sludge material at this location and remediation of this sludge area would yield orders of magnitude reduction in direct contact risks. The FFSI Work Plan recommended additional work to identify the nature and extent of this discrete area of sludge material to complete the evaluation of remedial alternatives.

Following USEPA approval of the FFSI Work Plan, the field investigation work was completed and the nature and extent of the sludge area were summarized in the Focused Feasibility Study Investigation Report (FFSI Report; Golder 1997b). The sludge area was determined to be approximately 4,000 square feet in area, as shown on Figure 1, and, based upon an average thickness of 10 feet, to have a total volume of approximately 1,480 cubic yards.

Subsequently, a Treatability Study Work Plan (Golder Associates, 1998a) was prepared and approved by USEPA to evaluate in-situ treatment technologies for remediation of the sludge area. The technologies chosen for evaluation during the Treatability Study were:

- Air stripping;

- Solidification/stabilization using portland cement with and without zero-valent iron amendment; and,

- Solidification/stabilization using organophillic clay with and without zero-valent iron amendment.

The results of the Treatability Study are presented in Appendix A and further discussed in Section 5.5 of this FFS.

2.0 INTERIM REMEDY

2.1 1990 Record of Decision

On September 14, 1990, USEPA issued a ROD selecting an interim remedy (referred to as the FOU) at the Site based on the Remedial Investigation (Dames & Moore, 1990), Feasibility Study (FS; ERM, 1989), and the Baseline Risk Assessment (BRA; Clement, 1990). The ROD defined the FOU as "contaminated soils and groundwater above the clay layer" and the selected remedy comprised the following elements:

- Installation of slurry wall around the entire Site;
- Installation of an infiltration barrier over the Site;
- Installation of a groundwater collection system and extraction of groundwater from the fill zone; and
- Off-Site treatment and disposal of extracted groundwater.

USEPA determined that the selected Interim Remedy would "reduce the migration of hazardous substances, pollutants and contaminants out of the first operable unit zone" and be "consistent with an overall remedy which will attain the statutory requirement for protectiveness."

2.2 Interim Remedial Measures

The Interim Remedy was designed and implemented by the Group pursuant to an Administrative Order (Index No. II CERCLA - 00116) dated September 28, 1990. The Interim Remedy consists of the following:

1. A lateral containment wall, comprising a soil-bentonite slurry wall with an integral high density polyethylene (HDPE) vertical membrane, which circumscribes the property;
2. A horizontal "infiltration barrier" consisting of HDPE covering the property;
3. A sheet pile retaining wall along Peach Island Creek that was constructed to facilitate installation of the slurry wall;
4. An extraction system for shallow groundwater consisting of seven wells screened in the fill which discharge to an aboveground 10,000 gallon holding tank via an above grade header system; and
5. A chain link fence which circumscribes the Site.

The design of the Interim Remedy was presented in the Interim Remedy Remedial Design Report (Canonie, 1991a) and construction occurred between August 1991 and June 1992. The Interim Remedy construction is documented in the Final Report - Interim Remedy for First Operable Unit (Canonie, 1992).

The Interim Remedy has been in operation since June 1992 and extracted groundwater is regularly shipped, via tanker trucks, to the DuPont Environmental Treatment (DET) facility, located in Deepwater, New Jersey, for treatment and disposal. Between March 1993 and March 1994, the extraction system was not operational because of pump fouling by free phase product. Subsequent investigations indicated that free phase product, although present, was not available in recoverable quantities (Canonie, 1994). Current pumping is focused on groundwater recovery.

In 1997 and 1998, the Group undertook the following additional cleanup activities (Golder Associates, 1998b):

- Characterization and off-Site treatment and disposal of the last remaining tank from the former SCP operation and its sludge contents;
- Characterization and off-Site disposal of Investigation Derived Waste (IDW); and,
- Demolition of a dilapidated building remaining from the former SCP operation.

The Group has also installed and maintained landscaping around the Site perimeter outside the fence line.

Maintenance and monitoring of the Interim Remedy is conducted pursuant to the USEPA approved Operations and Maintenance Plan (Canonie, 1991b) and subsequent Agency approved modifications. Regular Operations and Maintenance reports are submitted to USEPA which contain the following:

1. Summary of groundwater extraction;
2. Summary of Site inspections and maintenance activities;
3. Groundwater levels; and
4. Groundwater and surface water quality results from the quarterly sampling program.

To date, over 400,000 gallons of groundwater have been removed from the fill for treatment at DET. The groundwater within the fill has been lowered approximately 3 feet. Based on water level measurements from piezometers within and outside the slurry wall, inward gradients across the slurry wall are generally maintained, except along Peach Island Creek where the gradient is towards the Creek.

3.0 SITE CONDITIONS

The stratigraphy at the Site consists of the following units, from youngest to oldest:

1. Man-made fill (FOU);
2. Marine and marsh sediments;
3. Glaciolacustrine varved deposits;
4. Glacial till; and,
5. Bedrock.

The fill typically ranges in thickness from 3 to greater than 12 feet. A meadow mat of peat, organic silt, and clay intermixed with sand is the youngest natural material that underlies the fill. It generally forms a continuous layer at the Site and can range up to 7 feet in thickness. The meadow mat is underlain by marine organic grey fine sand, and silt layer, with a relatively uniform thickness of 2 feet across the Site. The grey silt is in turn underlain by glaciolacustrine deposits including an upper varved clay and a lower massive red clay. The glaciolacustrine unit ranges from 0 feet to 30 feet in thickness and is underlain by variable glacial till. Brunswick shale bedrock is encountered on-Site at approximately 60 feet below ground surface.

The following sections provide a brief overview of the pertinent results and conclusions of investigations conducted within the fill at the Site to date.

3.1 Summary of RI Data for Fill

Physical Characteristics

Test pit and boring investigations conducted during the RI (1986-1989) have provided valuable information which defines the physical characteristics of the fill. Twenty-three test pits and thirty-one borings were completed. In addition, eighteen soil borings (Canonie, 1991a) were installed around the perimeter of the Site as part of the slurry wall design investigation. Based on these data, the following conclusions can be drawn.

1. The fill material consists of a variety of construction and demolition (C&D) debris including large blocks of reinforced concrete and rock, steel beams, timber, stumps, scrap metal, fencing, piping, cable, brick, ceramic, concrete masonry block, rock/concrete rubble, etc. (Dames and Moore, 1990). Finer grained materials such as sands, gravels, silts, clays, and sludge-like material were identified mixed within the C&D debris. There does not appear to be any pattern of debris disposal at the Site except that smaller amounts of debris were detected in the eastern portion in the vicinity of RI boring B-1. C&D debris was present in every test pit except for one which was terminated at a shallow depth (approximately 2 feet) due to high VOC levels.

2. Previous estimates have indicated that between 50 and 80 percent of the fill volume consists of C&D debris (ERM, 1989). Golder Associates carefully reviewed the Test Pit Study Report (Dames and Moore, 1989) and photographs of subsurface material and has revised the previous estimates to about 60% (i.e., approximately 60% of the fill material is C&D debris and the remaining approximately 40% consists of finer grained particles within the C&D debris). The C&D debris fraction ranges in size with some pieces greater than several feet. A large portion of the C&D debris fraction is estimated to be greater than 6 inches in minimum dimension.

3. During the construction of the slurry wall, excavated debris was disposed into a temporary slurry hydration pond built on-Site as part of the Interim Remedy construction. In addition, the above ground debris piles and building remnants were graded beneath the IRM cover. Both of these activities are expected to have increased the already high proportion of C&D debris identified during the RI studies.

4. The standard penetration test data (blow counts) recorded from the Remedial Investigation boring program indicate that the large majority of blow counts are greater than 50 per foot. Many are reported greater than 100 per foot and as high as 200 per foot. For comparison, the blow counts for a compact coarse grained soil typically range from 10 to 30 per foot. These data again suggest that much of the material encountered in the borings consists of debris and there does not appear to be any particular pattern of placement. The lowest blow counts were measured at boring locations MW-7D and B-1 that were generally less than 10 per foot. At location B-1 penetration of the sludge-like material encountered occurred under the self-weight of the equipment (zero blow counts).

5. A review of historical aerial photographs indicates that between the late 1960s and 1980, two ponds existed at the eastern corner of the Site in the vicinity of borings B-1 and MW-7D. As noted above, borings B-1 and MW-7D exhibited some of the lowest blow counts recorded at the Site.

Chemical Characteristics

During the remedial investigation, 34 soil samples were collected within the fill from 17 boring locations (Dames and Moore, 1990). Boring locations were biased toward potential source areas as identified in aerial photographs and former operation areas. Samples were collected from each boring at two intervals: 0 to 2 feet (surface) and 5 to 6 feet (subsurface). The samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, PCBs, and metals.

A number of chemical constituents were detected, primarily VOCs, SVOCs (generally polynuclear aromatic hydrocarbons or PAHs), a small number of pesticides, PCBs, and metals. While the maximum detected concentration of some of these constituents is elevated (e.g., 15,000 mg/kg PCB at the surface interval in boring B-1), most constituent detections are less than the USEPA preliminary remediation goals (PRGs; USEPA letter dated November 19, 1993). Table 1 provides a summary of the number of constituent concentrations which were detected above the USEPA PRG.

With respect to the PCB results, only two other boring locations besides B-1 exhibited PCB concentrations in excess of 100 mg/kg (boring MW-3S, two detections up to 290 mg/kg, and boring MW-2D, one detection at 350 mg/kg). All other PCB detections (30 of 34 samples) were less than 100 mg/kg i.e., at least two orders of magnitude less than the PCB concentration detected at B-1. Boring B-1 also exhibited the highest levels of VOCs as well as elevated concentrations of copper and lead.

It is important to note that the PCB concentration detected in boring B-1 (15,000 mg/kg) accounts for about 97% of the total estimated carcinogenic risk at the Site for both current and potential future surface soil exposures (Clement Associates, Inc., 1990). Clearly, PCBs at boring location B-1 are driving the potential Site risks. It is important to note that the estimated risk is presently being mitigated by the interim remedy cover installed at the Site and the final remedy proposed in this FFS will permanently address this risk.

3.2 Sludge Area Investigation

The sludge area investigation was conducted pursuant to the FFSI Work Plan (Golder, 1997a) and was designed to gather data on the nature and extent of the potential sludge area in the vicinity of RI boring B-1. Geophysical and soil boring techniques were used and the results of the investigation were presented in the FFSI Report (Golder, 1997b).

In summary, the investigation confirmed the presence of a discrete area of sludge in the eastern portion of the Site with the following general characteristics:

- The sludge area is approximately 4,000 ft^2 in areal extent and consists predominately of sludge material and fine grained soil with little debris. A surficial layer of fill approximately 0.5 to 8 feet thick overlies the sludge and, based on an average thickness of 10 feet, the volume of sludge is approximately 1,480 cubic yards.

- The chemical characteristics for the sludge area include the highest VOC and PCB concentrations detected anywhere on-Site.

Total VOC concentrations ranged from 1,765 mg/kg to 36,320 mg/kg and PCB concentrations (Aroclor 1242) ranged from 49 mg/kg to 1,400 mg/kg in the 1997 investigation[1].

[1] Significantly, the single PCB result of 15,000 mg/kg reported in the RI has never been replicated. All other RI and subsequent results are at least an order of magnitude lower.

4.0 REMEDIAL ACTION OBJECTIVES

The overall purpose of the OU-2 remedy is to provide long-term contaminant source control through a combination of treatment and containment. Specific Remedial Action Objectives (RAOs) are as follows:

- Mitigate direct contact risk and leaching of contaminants from the fill and sludge;
- Mitigate the toxicity and mobility of the "principal threat[2]" sludge contaminants via treatment;
- Provide hydraulic control by maintaining groundwater levels within the slurry wall below the corresponding levels in piezometers outside the slurry wall, and treat the extracted groundwater; and,
- Perform remediation in such a manner that allows site re-use for commercial purposes.

[2] "Principal Threat" refers to source material that is highly toxic or highly mobile and acts as a reservoir for migration of contamination. The NCP establishes an expectation that EPA will use treatment to address the "Principal Threat" wherever practicable (40 CFR 300.430(a)(1)(iii)(A)).

5.0 SCREENING OF SOURCE CONTROL ALTERNATIVES

5.1 No Further Action Alternative

For consistency with the NCP, a No Further Action alternative has been evaluated.

The No Further Action Alternative would consist of maintaining the current Interim Remedy as described in Section 2.2 with ongoing operation, maintenance, and monitoring. In terms of the RAOs, the Interim Remedy currently mitigates the direct contact risk at the Site via the existing HDPE geomembrane and perimeter security fence. The HDPE geomembrane also functions to minimize infiltration into the fill and the leaching of contaminants to groundwater while the slurry wall provides a horizontal barrier to lateral migration of contaminants from the fill. Similarly, the groundwater extraction system functions to maintain substantially inward gradients across the slurry wall to further mitigate lateral migration of contaminants. Extraction and off-Site treatment of groundwater reduce the volume of contaminants within the groundwater and also address the statutory preference for treatment.

However, the No Further Action Alternative does not address the toxicity and volume of contaminants in the fill, notably, the sludge area identified in the eastern part of the Site. Furthermore, the No Further Action Alternative would leave the existing HDPE geomembrane cover in-place. The existing geomembrane has not had a soil cover since installation in 1992 and was not constructed as a permanent cap. Thus, it will be subject to deterioration over time. Similarly, the No Further Action alternative would leave the existing temporary sheet pile wall along Peach Island Creek in its current condition. The sheet pile wall was installed during the Interim Remedy as a temporary structure to facilitate installation of the slurry wall and is significantly inclined towards Peach Island Creek, necessitating regular monitoring and limiting future use of the property. Finally, No Further Action does not provide the flexibility for beneficial end-use of the Site.

In summary, the No Further Action Alternative would meet many of the RAOs but cannot be considered a permanent solution and, as such, this alternative has been eliminated.

5.2 Site Wide Excavation /Ex-situ Treatment Alternative

The implementability of Site wide excavation (to be followed by ex-situ treatment on or off-Site) was previously evaluated as reported in the FFSI Work Plan (Golder Associates, 1997a).

Significant impediments to implementation, as well as short-term effectiveness concerns, were anticipated, as detailed below:

Excavation Processes

1. Due to the heterogeneous nature and large size of debris, significant manual work would be required to separate materials during excavation. This would pose significant worker safety concerns and would slow production rates.

2. Numerous excavated material stockpiles would have to be created for the various material types, sizes, conditions, and chemical characteristics. Separate stockpiles would be necessary for the following categories of material: large size debris suitable for size reduction; large size debris unsuitable for size reduction; saturated fill; unsaturated fill; rubber and plastics; metal (cable, wire, pipe, etc.) and predominantly small grain size fill. Certain debris may be further divided into individual stockpiles (e.g., reinforced concrete, large timber, tires, etc.).

3. Due to the variety of debris that will be encountered, several types of heavy equipment would be needed for excavation, including backhoes, cranes, dump trucks, flat beds, support vehicles, etc. Staging, decontamination, and refueling stations would be required.

4. Extensive dewatering would need to be conducted prior to or during any excavation activities. Notwithstanding the dewatering efforts which form part of the Interim Remedy, it is expected that near saturated conditions will remain and pockets of saturated material would be present. Saturated excavated materials would need to be drained prior to further material separation/stockpiling/handling; a process which may take days to weeks. These conditions are expected to slow and complicate the excavation process, and present additional safety hazards for workers.

5. Numerous physical hazards to workers would exist associated with the handling of the heterogeneous/large size debris, slippery conditions, and working in cumbersome Level B personnel protection. The net effect of these conditions would be to slow excavation progress and put workers and off-Site receptors at an increased health and safety risk.

6. Very limited space is available to conduct the required activities, further complicating the process.

7. Extensive decontamination (both personnel and equipment) would be required to minimize the spread of contaminants on-Site and off-Site. Implementing these activities will further complicate and slow the excavation and material handling progress.

8. Control of VOC vapors, dust, and odors and extensive air monitoring would need to be provided.

9. Control of precipitation run-on into excavation/material handling areas and precipitation run-off from these areas would need to be provided to protect both nearby human and ecological receptors.

Excavation Stability

The soft soils (meadow mat, silts and clays) immediately underlying the fill are cause for further concern with respect to excavation. The meadow mat layer (soft silt and clays, high in organic content) has low shear strength based on the low recorded blow counts (on the order of 2) and laboratory testing results.

In order to protect the integrity of the existing slurry wall, a stable excavation side slope angle would need to be maintained. The slurry wall is a non-structural feature and failure of the excavation side slope would cause a corresponding failure of the adjacent section of the slurry wall. Preservation of the slurry wall is an essential component of any remedial action since, as USEPA noted in its 1990 ROD for the Site, "The elements of the interim remedy are prerequisite components of a permanent remedial action for the first operation unit zone."

A preliminary excavation stability analysis was conducted for three different side slopes angles. The analysis showed that an excavation side slope angle of four horizontal to one vertical (4H:1V) would be required for stability even under temporary, short-term construction conditions. Considering a 4H:1V side slope angle, together with a 5-foot buffer zone to protect the slurry wall, approximately 16,000 cubic yards, or about 18% of the FOU fill, would have to be left in place to protect the slurry wall, thus reducing the effectiveness of the remedy.

Because of the large volume of FOU fill that could not be excavated, the use of a sheet pile wall to support the excavation was considered as a means to increase the potential excavation volume. However, a sheet pile wall cannot be successfully used to stabilize the slurry wall during FOU fill excavation for the following reasons:

1. Due to the amount and large nature of debris, a sheet pile wall could not be installed through the debris without excavation (as was necessary to install the existing sheet pile wall along Peach Island Creek, which was constructed prior to the slurry wall). Excavation of debris adjacent to the slurry wall could cause failure of the surrounding soil and damage to the slurry wall.

2. Low-strength clay soils (glaciolacustrine varved unit) underlie the meadow mat layer. To provide adequate stability for the wall, the sheet piles would likely need to be driven through the low permeability confining unit and into the underlying till. However, penetrating the clay confining unit could create a downward migration pathway for constituents contained within the fill, (i.e., the existing containment system would be compromised and additional spread of contamination could result). Such migration could be exacerbated by the downward hydraulic gradients that exist between the fill water and the underlying groundwater unit.

In summary, the geotechnical limitations are such that a significant volume of fill could not be removed without jeopardizing the integrity of the existing containment system.

Material Handling

In order to prepare material for off-Site disposal, significant material handling would be required:

1. Multiple screening steps would be required to provide adequate separation of FOU fill debris and would include, at a minimum, manual separation, magnetic separation, and various types of screening (e.g., vibratory and inclined).

2. Multiple stockpiles, including material loading and unloading areas, would be required to be maintained prior to and after most of the material handling steps.

3. Size reduction (crushing, shredding, and manual cutting) and further material separation, screening, and stockpiling would be required for a large portion of the debris.

4. Significant worker safety issues (physical and chemical hazards), air monitoring, decontamination, control of VOC, dust and odors, and protection of nearby receptors during material handling activities would be a major concern.

5. Insufficient space exists on Site to manage the multiple waste streams and stockpiles that would be required.

VOC/Dust/Odor Controls

Previous consultants (ERM, 1989) concluded that over 99.9% of the VOC and dust emissions from the Site would need to be controlled to protect a worst-case nearby off-Site receptor. This control requirement is based on the approximate emissions generated as a result of only limited excavation/material handling activities (one backhoe, one truck, and loading/unloading). Many of the dynamic material handling steps that would be required as part of an excavation alternative were not considered. In addition to the human health risks associated with VOC and dust emissions from the Site during excavation and material handling, nuisance odors are also likely to be a concern since the Site is located in a developed area. Because of the material handling requirements, which would result in increased emissions and a corresponding increase in the degree of controls required, it is probable that the excavation and material handling activities for the entire Site would need to be conducted within an enclosed structure.[3] Emissions from the enclosure would require treatment prior to being discharged to the atmosphere. The additional

[3] USEPA (1992) has shown that foams and other engineering controls are not effective means of controlling VOC emissions from dynamic material handling processes of the types involved in this instance.

difficulties associated with conducting the excavation and material handling activities within an enclosure are numerous and include the following:

1. Large and likely multiple enclosures would be required to contain emissions from the numerous excavation and material handling steps; construction and maintenance of such enclosures on such a confined site would be extremely complex.

2. The rate of ventilation (and corresponding treatment) would need to be properly sized to prevent buildup of VOC vapors, and prevent buildup of explosive gas mixtures. USEPA has shown that the required ventilation rates can be higher than expected to provide the necessary level of protection (USEPA, 1992).

3. Additional VOC, carbon monoxide, and particulates would be emitted by heavy equipment (diesel engine exhaust) operating within the enclosure, which would exacerbate health and safety risks.

4. The risks associated with damage, leakage or rupture of the enclosure and decreased efficiency or failure of emission control equipment leading to releases of VOC and odors to the atmosphere are very significant.

Summary

Site-wide excavation and ex-situ treatment processes were eliminated because of implementability and short-term effectiveness concerns arising principally from the following factors:

1. Material handling and treatment problems caused by heterogeneity of the fill material and the presence of large volumes of massive rubble and debris;

2. Inability to reliably control VOC and odor emissions during excavation in an urban area bounded by public streets, thereby placing nearby receptors at unacceptable risk;

3. Very limited space on-Site to accommodate ex-situ material handling processes and multiple waste streams;

4. Geotechnical limitations on the extent of excavation while protecting the integrity of the existing slurry wall;

5. Serious concerns for worker health and safety as a result of having to work in enclosures, in Level B protective equipment, operating heavy equipment and performing manual work in crowded, slippery, and reduced visibility conditions.

5.3 Sludge Area Excavation /Off-Site Treatment Alternative

This removal alternative has been evaluated at the request of the USEPA and focuses on evaluating the feasibility of excavating the sludge area only. Many of the significant impediments to implementation, as well as short term effectiveness concerns discussed in Section

5.2 would also apply to this removal alternative. A more detailed evaluation of these issues is presented in Section 8.

The main elements of the excavation and off-Site treatment alternative are as follows:

Excavation

A preliminary geotechnical evaluation was performed to assess the type of construction that would be needed to provide a stable excavation, protect the integrity of slurry wall (which is within 10 feet of the sludge at some locations) and limit the potential for vertical migration of contaminants to the underlying till and bedrock units.

Based on this evaluation (see Appendix B), an internally braced excavation system (IBES) would be required to meet these requirements and avoid penetrating the clay layer that is less than 5 feet in thickness. A conventional cantilevered retaining wall system was evaluated but the required embedment depths would exceed the depths of the underlying clay unit and provide a vertical migration pathway for contaminants. The components of the IBES would include steel interlocking sheet piling, steel whalers to transfer loads, and at least two levels of steel cross-braced struts. The entire sludge area could not be excavated together but would have to be divided into approximately three separate "cells". An IBES would be installed in each cell and the cells would be excavated and backfilled in series so that only one cell would be open at a time.

A portion of the sludge material is located below the water table. Dewatering activities would be conducted prior to and during the excavation activity with off-Site treatment and disposal of the groundwater. It is estimated that approximately 15,000 gallons of contaminated groundwater would be generated during excavation activities.

VOC, Dust and Odor Control

During excavation, VOC emissions, dust emissions and odor would need to be rigorously controlled to protect nearby off-Site workers and the general public. To achieve the greatest control, excavation activity would likely need to be completed within a fully enclosed structure so that VOC and dust emissions could be collected and treated prior to discharging to the atmosphere. Risks to workers on-Site, off-Site and to the general public would be elevated even in the presence of the best available controls, as described further in Section 8. Captured VOC emissions would be treated using appropriate technologies such as catalytic oxidation or phase activated carbon absorption. The air treatment method would need to be determined during the design.

Transportation, Treatment and Disposal

Approximately 2,400 cubic yards of material (including sludge and overlying fill) will be excavated from the sludge area. Waste profiling and formal acceptance by the disposal facility will be required prior to final loading of the excavated material into closed boxes for transport by truck and/or rail over 1500 miles to the nearest available treatment and disposal facility. Incineration of the sludge material will be required because of the concentrations of PCBs, and currently only two facilities nationwide, both in Texas, are permitted to accept such waste (see Appendix E). Staging and loading of the material will need to be completed in an enclosed structure to mitigate off-Site risks (control VOC emissions to the atmosphere) and addition and mixing of stabilization agents is expected to be required so that the material will pass the paint filter test as stipulated by the disposal facilities.

5.4 In-Situ Treatment Alternatives

The following in-situ treatment alternatives were evaluated:

- Solidification/stabilization;
- Bioremediation; and,
- Thermal desorption.

Site-wide application of these technologies was evaluated with technology experts retained by the Group and eliminated on the basis of implementability problems due to the condition of the fill material, as discussed above. In-situ bioremediation of the sludge area was also eliminated because the high contaminant concentrations present would preclude biological treatment. In-situ thermal desorption of the sludge area was evaluated in detail as described below.

In-situ thermal desorption of the sludge would be achieved via installation of thermal wells, consisting of a perforated outer steel casing and interior heating element, in a closely spaced triangular pattern throughout the area. A heat resistant silica blanket would also be placed over the area forming a seal to minimize losses of VOC and steam, as well as to reduce intrusion of atmospheric air. The wells and an approximately 6-inch wide concentric halo would be heated to

1,400° F. Heat propagating throughout the area would first vaporize moisture, and then increase sludge temperatures to around 450°F (about 2/3rd of the boiling point of PCBs). A modest vacuum (3 to 5 inches water) would be applied to each well in the system to remove vapors. Extracted vapors would be treated by an indirect fired thermal oxidizer at ground surface followed by a heat exchanger and a vapor phase activated carbon (VPAC) system.

Evaluation with technology vendors revealed the following implementability and effectiveness concerns with this technology:

1. The high moisture content of the sludge would lead to greatly extended treatment times since virtually all moisture must be vaporized before sludge temperatures increase and allow contaminant desorption. Visible steam emissions would also be significant, given the prominent position of the Site at the intersection of two busy roadways.

2. Preliminary calculations indicated that large quantities of Hydrogen Chloride (HCl) would be generated, giving rise to the following concerns:

    - HCl could react with metals forming more soluble compounds (salts) that would be more mobile;
    - Condensation of HCl anywhere in the system is expected to cause significant corrosion problems; and
    - Potential HCl emissions would likely require the addition of a scrubber to the treatment train.

3. Well spacings would need to be very small to achieve adequate vapor extraction through the low permeability sludge.

4. Thermally treating the high levels of total organic carbon in the sludge (associated with oil and grease) would cause ash and/or coke buildup around the wells. This, in turn, could "blind" the wells, or at least significantly reduce the overall efficiency of the wells to extract vapors and control potential releases at the surface.

5. The treatment temperatures would cause vaporization of metals which could, in turn, poison the thermal oxidizer resulting in poor treatment performance.

6. The technology is relatively new and innovative and has not been used in similar field conditions. As a result, a field pilot test would be required to establish its feasibility.

This evaluation lead to elimination of in-situ thermal desorption for the sludge area.

Following USEPA's concurrence with this initial screening, and completion of the sludge area investigation, the Group proposed a sludge treatability investigation (Golder Associates 1998a) focusing on in-situ air stripping and solidification/stabilization. Following USEPA approval of the work plan, the treatability study was undertaken as discussed in the following section.

5.5 Treatability Study for Sludge Area

As described in the approved Work Plan (Golder Associates, 1998a), the broad objectives of the treatability study were to:

- Evaluate the effectiveness of in-situ air stripping for reducing VOC concentrations prior to introduction of the various solidification/stabilization (S/S) agents;
- Identify formulations using cement-, lime- and clay-based S/S agents that will provide reasonable bearing strength and physical characteristics consistent with potential future Site use;
- Evaluate the reduction in total constituent concentration achieved by selected S/S agent formulations;
- Evaluate the reduction in constituent mobility provided by selected S/S agent formulations through the Synthetic Precipitation Leaching Procedure (SPLP); and
- Evaluate whether zero-valent iron amendment can provide additional treatment of chlorinated organics.

The treatability testing was conducted in four phases:

Phase I – Field Sampling and Baseline Characterization: This phase involved the collection of sufficient volume of material from the sludge area to support the treatability testing; homogenization of the sludge material in the laboratory; chemical testing of the material including total and SPLP analysis for VOCs and PCBs and physical testing to establish baseline conditions.

Phase II – Screening Tests: This phase involved identifying various cement, lime, and/or clay additions and conducting associated strength testing to produce the necessary physical properties of the solidified mass.

Phase III – Intermediate Tests: This phase involved separate evaluations of the effectiveness of air stripping and the chemical effectiveness of the mixtures identified in Phase II with and without iron amendment. Analytical and strength testing was conducted at this stage to compare concentrations of VOCs and PCBs in the various mixtures to evaluate the reduction in the toxicity, mobility and volume.

Phase IV – Verification Tests: This phase involved verifying treatment trains(s) identified in Phase III to evaluate the overall level of treatment that will be provided. Testing included chemical and physical properties.

A brief description of the results from Phases I through IV is presented below. A detailed report from the treatability laboratory Kiber Environmental Services, Inc. (Kiber) of Norcross, Georgia is included in Appendix A.

Phase I – Field Sampling and Baseline Characterization

Sludge samples for treatability testing were collected on November 1 and 2, 1999. The samples were collected in the area of borings GB-06 and GB-07 that was found to have the highest PCB and VOC concentrations in the previous investigation. A total of three borings were drilled using 10.25"ID hollow stem auger. Approximately 20 gallons of sludge was collected from the drill cuttings and placed in 2-gallon buckets, which were then overpacked in 5-gallon steel buckets, sealed, and shipped, under chain-of-custody, to the treatability laboratory.

The samples were homogenized in the laboratory and three samples were collected for analytical and physical testing. These "parent material" results are summarized below:

	Untreated Parent Sample Concentrations (ppm)		
	A	B	C
Total VOCs[4]	31,270	24,077	33,794
TCE	8,800	6,800	9,500
PCE	6,600	4,900	7,100
PCBs	630	330	990
Total Pesticides	4.7	9.6	13
Total Arsenic	13	13	18
Total Lead	860	770	1,200
Chloride	1,200	2,700	5,700
Ignitability (°C)	35	39	39
Moisture Content, Dry Basis (%)	58	62	59
pH (Std. Units)	8.9	9.2	9.1
Bulk Density (lb/ft^3)	95	95	95
Bulk Specific Gravity	1.5	1.5	1.5

The average total VOC concentration of the three parent samples was 29,714 ppm which is comparable to the highest total VOC concentrations reported for samples collected during the FFS Investigation. Full TCL VOC analyses were conducted; PCE and TCE concentrations are specifically identified in the above summary since previous data indicated they exceeded Site PRGs. The PCB results (all Aroclor 1242) are comparable to the average concentrations detected during the FFS Investigation. Dieldrin was the only pesticide detected.

[4] Extended VOC list as defined in EPA SW-846 Method 8260 (December 1996)

Parent material samples were also subjected to SPLP and the analytical results are summarized below:

	SPLP Concentrations for Untreated Parent Samples (ppm)		
	A	B	C
Total VOCs[4]	236	241	237
TCE	84	89	86
PCE	14	15	16
PCBs	5	3.3	4.4
Total Pesticides	0.06	0.043	0.045
Total Arsenic	<0.10	<0.10	<0.10
Total Lead	2.6	3.2	3.6

The SPLP results are important for comparison to the corresponding post-treatment results to assess the reduction of mobility of the constituents.

Phase II – Screening Tests

A total of 12 mixes of cement, cement and clay, and cement and lime were developed based on Kiber's previous experience. The organophillic clay used for testing was manufactured by RHEOX, Inc. of Hightstown, New Jersey. Unconfined compressive strengths were estimated using a pocket penetrometer at various intervals through 21 days of curing. Unconfined compressive strength tests (ASTM D2166) were run following a 21-day cure time on eight of the samples based on the pocket penetrometer results and visual condition of the samples. The various mixes and results of the strength tests are summarized in the table below.

				21 Day			
Reagent Type	Reagent Addition (%)	Water Addition (%)	21-Day Penetrometer Strength Testing (tons/ft^2)	Moisture Content (%)	Bulk Density (lbs/ft^2)	Dry Density (lbs/ft^2)	UCS (lbs/in^2)
Type I Portland Cement	10	8	1.5	42	101	71	14
Type I Portland Cement	20	16	1.0	44	100	69	11
Type I Portland Cement	30	17.5	0.5	--	--	--	--
Type I Portland Cement	40	20	2.0	41	107	76	11
Type I Portland Cement	50	25	2.5	37	106	77	14

Type I Portland Cement/ Organophillic Clay	20/3	16	1.5	44	102	71	14
Type I Portland Cement/ Organophillic Clay	40/3	28	0.5	--	--	--	--
Type I Portland Cement/ Organophillic Clay	20/5	25	0.5	51	97	64	6
Type I Portland Cement/ Organophillic Clay	40/5	27	1.0	44	101	70	12
Type I Portland Cement/ Organophillic Clay	40/7	30	1.0	--	--	--	--
Type I Portland Cement/ Hydrated Lime	10/10	27.5	0.5	--	--	--	--
Type I Portland Cement/ Hydrated Lime	20/20	40	0.5	52	95	63	15

Although the various reagent types resulted in relatively low strengths, it should be noted that the waste material tested has a very high organic content. Air stripping of the material, which will reduce the organic content of the waste material, along with a longer curing time, results in greater strength for the stabilized material (see below).

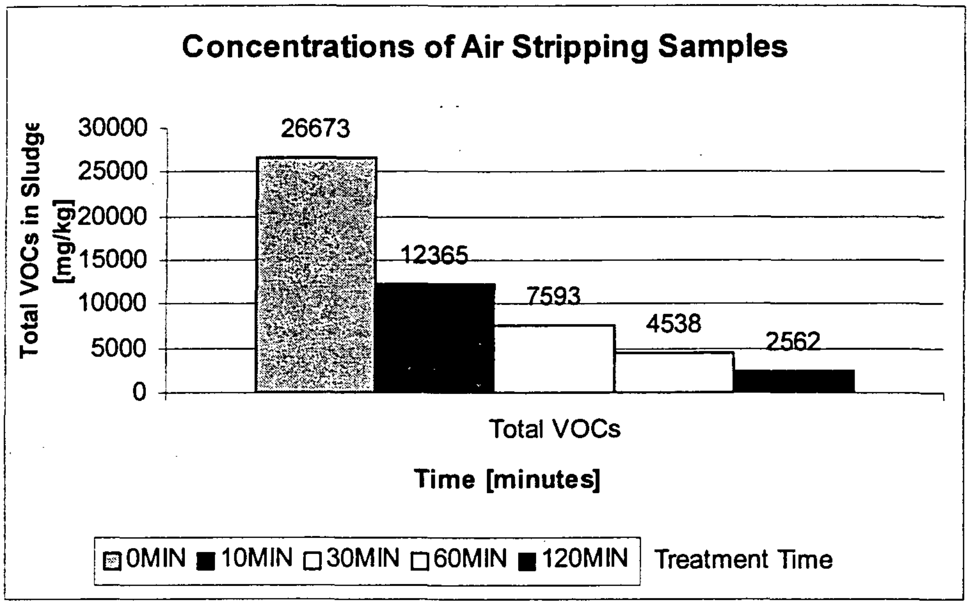
Phase III – Intermediate Tests

Phase III consisted of two separate parts, air stripping and evaluation of selected mixtures for physical and chemical testing. The results are summarized below.

Air Stripping

Air stripping was conducted to evaluate the potential for full-scale in-situ air-stripping treatment to reduce the total concentration of volatile organics prior to stabilization/solidification. Air stripping was performed in an airtight mixing chamber using a Hobart-type mixer with the injection of air to promote volatilization. Initial samples of the sludge material were obtained and after 10, 30, 60 and 120 minutes of air stripping treatment. The samples were tested for total VOCs. The results are summarized in the table and chart below. A 90% reduction in total VOCs was achieved after 120 minutes of air stripping. As a result, in-situ air stripping was carried forward into Phase IV.

	Sludge Concentrations (ppm) following air stripping for:				
	0 min	10 min	30 min	60 min	120 min
Total VOCs	26,673	12,365	7,593	4,538	2,562
TCE	8,000	2,600	1,200	560	260
PCE	5,800	2,900	1,800	1,100	610



Three carbon cartridges were placed in series to capture VOC emissions. VOC concentrations were measured in the carbon, however breakthrough occurred for all units.

Mixture Testing

The following four mixtures were separately evaluated in Phase III (based on the Phase II results summarized above):

1. 10% Portland Cement
2. 20% Portland Cement/3% Clay
3. 20% Portland Cement/5% Clay
4. 10% Portland Cement/10% Hydrated Lime

Each mixture was tested separately with and without zero valent iron amendment. The iron was added at a rate of 5x the stochiometric amount required for dechlorination of all chlorinated VOCs and PCBs based on the results of the Phase I testing (about 10% iron by weight). The iron selected was a fine-medium gradation supplied by Connelly – GPM, Inc.

Four aliquots of the parent material were selected for testing. The material was tested for Total and SPLP VOCs and PCBs, and total chloride for the untreated and treated samples following a 21-day curing period. Unconfined compressive strength was also performed on the treated samples. For those samples amended with iron, the iron was added to the sample and allowed to react in a sealed container for 3-days prior to adding the cement/clay/lime. In order to directly compare samples with and without iron, the non-iron samples were given a similar level of mixing and also allowed to sit for 3 days prior to the cement/clay/lime addition.

Unconfined compression strength test results for the cured samples ranged from 23 to 49 psi, well above the goal of 15 psi established in the Work Plan. However, the total constituent analyses were largely inconclusive because of the high degree of non-homogeneity as reflected in the variability of the untreated sample results (see Appendix A). The SPLP analyses indicated substantial reductions in PCBs and VOCs, with the 10% cement/10% lime mixture generally being the most effective. The cement/clay mixtures appeared generally less effective than cement or cement/lime.

Phase IV – Verification

The scope of Phase IV testing was expanded and enhanced from that included in the Work Plan to repeat some of the total constituent analyses from Phase III. Phase IV Verification Testing was performed using the following solidification/stabilization reagents:

- 10% cement;
- 10% cement with iron amendment;
- 10% cement / 10% lime; and,
- 10% cement / 10% lime with iron amendment.

In order to confirm that the untreated material was reasonably homogeneous and representative, two samples were tested for total VOCs and PCBs on a quick turnaround basis with the following results:

Untreated Sample Concentrations (ppm)		
	A	B
Total VOCs (ppm)	23,578	31,334
TCE (ppm)	6,900	9,100
PCE (ppm)	5,200	6,300
PCBs (ppm)	580	600
Total Pesticides (ppm)	0	0
Total Arsenic (ppm)	12	11
Total Lead (ppm)	810	750
Chloride (ppm)	9,400	10,000

SPLP Concentrations for Untreated Samples (ppm)		
	A	B
Total VOCs (ppm)	233	400
TCE (ppm)	87	130
PCE (ppm)	15	55
PCBs (ppm)	.058	.051
Total Pesticides (ppm)	0	0
Total Arsenic (ppm)	.027	.055
Total Lead (ppm)	0.94	1.6

The average total VOC concentration of the two parent samples was 27,456 ppm, which is consistent with the Phase I parent sample analyses and is comparable to the highest total VOC concentrations reported for samples collected during the FFSI. The PCB results (all Aroclor 1242) were comparable to the Phase I and Phase III parent concentrations although somewhat less than the maximum reported field concentration.

Following verification that the parent material was acceptable, Kiber proceeded to the next step in Phase IV testing. Four aliquots of sample were subjected to bulk air stripping for two hours in a fume hood. Once air stripping was completed, iron filings were mixed into two of the aliquots and allowed to react for three days. In order to compare samples with and without iron, the two sample aliquots without iron addition were given a similar level of mixing and also allowed to sit for the three-day period prior to mixing with S/S reagents. Once the reaction time was complete, a sample of each mixture was submitted to the laboratory for analysis of Total VOCs, Total PCBs and Chloride. These analyses are shown on Table 2. The data are presented as reported by the laboratory and adjusted for reagent dilution. The data, adjusted for reagent dilution, have been reported for the purpose of interpreting the underlying level of treatment achieved from the treatability study. The data reported by the laboratory are representative of concentrations of constituents in the actual stabilized sludge material and are appropriate for considering risk from exposure to the treated material. These results demonstrate that air stripping is an effective means for removing VOC mass from the sludge material. Total VOC removal varied between 79% to 94% after air stripping for a two hour period in both Phase III and Phase IV.

Following the 3-day period, Kiber added the appropriate S/S materials to the four mixtures and allowed them to cure for 28 days. Samples of the cured materials were collected and submitted to the laboratory for the following analyses:

- VOCs (Total Constituent and SPLP);
- PCBs (Total Constituent and SPLP);
- Pesticides (Total Constituent and SPLP);
- TAL Metals (Total Constituent and SPLP);
- Total Chloride; and,
- Ignitability.

The results of these analyses are summarized in Tables 3 and 4 for total constituent and SPLP analysis, respectively. Results are presented as reported by the laboratory and adjusted for reagent dilution, as discussed above.

Following 28 days of curing, samples of the cured material were tested for Unconfined Compressive Strength with the following results:

				Following 28 Day Cure			
Reagent Type	Reagent Addition (%)	Water Addition (%)	28 Day Cure Volumetric Expansion (%)	Moisture Content (%)	Bulk Density (lbs/ft^2)	Dry Density (lbs/ft^2)	UCS (lbs/in^2)
Type I Portland Cement	10	5	4	29	105	81	71
Type I Portland Cement with Iron Addition	10	4.5	7	22	113	92	84
Type I Portland Cement/ Hydrated Lime	10/10	17	32	30	92	71	53
Type I Portland Cement/ Hydrated Lime with Iron Addition	10/10	15	32	31	102	79	42

All results were well above the goal of 15 psi and exceeded those obtained during Phase II and Phase III testing. The additional curing time and air stripping the waste material prior to reagent addition appears to have a positive effect on the strength of the S/S material.

The Phase IV Total Constituent Analyses (Table 3) indicate that air stripping followed by stabilization with any of the four mixtures is effective for treatment of VOCs. However, the addition of lime appears to modestly improve remediation of the PCBs. The addition of iron has not been conclusively shown to provide any added benefit for the treatment of VOCs; although some additional reductions were apparently realized in PCB concentrations. However, the chloride data does not confirm dechlorination of VOCs and PCBs by the iron amendment.

Based upon the Phase IV SPLP chemistry results (Table 4), the 10% cement/10% lime mixture provides enhanced treatment for VOCs as compared to cement only. However, there was no appreciable difference in the treatment of PCBs. Improved treatment by the iron amendment also could not be confirmed.

Conclusion

The treatability study results indicate that air stripping followed by solidification/stabilization with either 10% cement or 10% cement/10% lime is an effective treatment for the sludge. In both cases, total VOCs and SPLP VOCs are reduced by around 95%. SPLP PCBs are reduced by in excess of 95%. The addition of lime may improve the treatment of PCBs (to 99%), although amendment with iron was not conclusively shown to provide additional treatment.

USEPA formally approved the results of the Treatability Study in a letter dated January 31, 2001.

6.0 RETAINED SOURCE CONTROL ALTERNATIVES

6.1 Overview of Retained Alternatives

Two specific source control alternatives, as described below, have been retained at the request of USEPA. Both alternatives satisfy the Remedial Action Objectives defined in Section 4 and provide consistency with the existing Interim Remedy in accordance with the requirements of the 1990 ROD. In addition, both alternatives are consistent with potential future remedies for OU-3 (deep groundwater). Each of the alternatives includes the following common elements:

- A cover system within the limits of the existing slurry wall to mitigate risk via the direct contact pathway, minimize infiltration and leaching of the fill, and provide flexibility for future Site re-use for commercial purposes;
- Shallow groundwater extraction to provide hydraulic control by maintaining groundwater levels within the slurry wall below the corresponding levels in piezometers outside the slurry wall, together with off-Site treatment of the extracted groundwater;
- Enhancements to the existing streambank to provide a long-term stability consistent with potential future commercial use of the Site and to improve aesthetics;
- Maintain key elements of the existing Interim Remedy including the existing slurry wall to provide lateral containment and mitigate contaminant mobility. The existing groundwater extraction system and cover will be enhanced as described above;
- Institutional controls through the implementation of deed restrictions on the use of the property; and,
- Post construction monitoring and operation and maintenance to ensure the continued integrity and functioning of the remedy.

The Retained Alternatives differ in the manner with which the toxicity and mobility of the sludge is address, as follows:

1. Excavation and off-Site treatment; and,
2. In-situ treatment.

The individual components of the retained alternatives are described in detail in the following sections. An evaluation of the alternatives against the NCP criteria is provided in Section 8.

6.2 Cover

The cover system will be designed, constructed and maintained to meet the substantive requirements of RCRA Subtitle C (40 CFR 264.310). The cover system will be designed to provide flexibility for the potential end-use of the Site for commercial purposes. As such, two preliminary cover sections have been identified, a vegetated surface option and an asphalt surface option. Conceptual cross-sections for each system are illustrated in Figure 2 and feature "double containment" in both cases. In the vegetated option, the two containment layers are a geomembrane and a geosynthetic clay layer, and in the second option the asphalt layer and a geomembrane provide the two barriers. Alternate methods and materials, which provide equal or superior performance, may be considered during design. The basic components of each of the cover sections include a prepared subgrade, a double barrier system, and a drainage layer. The barrier system will be designed to achieve a maximum permeability of 1×10^{-7} cm/sec.

The cover system will extend over the area currently circumscribed by the slurry wall. A combination of the cover cross-sections may be used based on the potential end-use of the Site. Prior to construction of the cover, the Site will be graded to provide adequate drainage and proof-rolled to provide a suitable subgrade for cover construction. Grading will be minimized to the extent practical to limit disturbance of the existing ground surface. Fill generated from the streambank and groundwater extraction system enhancements described below may be used for grading purposes. Site drainage will be directed to Peach Island Creek consistent with existing conditions.

6.3 Shallow Groundwater Extraction and Off-Site Treatment

Shallow groundwater extraction and off-Site treatment will continue as part of the final remedy to maintain hydraulic control within the slurry wall. The existing extraction system will be upgraded via installation of approximately seven new extraction wells installed around the perimeter of the Site (see Figure 3). The wells and related header system piping and electrical wiring will be installed underground in clean utility corridors around the Site perimeter to maximize flexibility for future Site use. A geotextile will be placed within the utility corridor to separate the existing fill from clean imported soils. Excavated soils will be used as grading fill under the proposed cover.

Extracted groundwater will be conveyed to a collection point for off-Site disposal. The preferred disposal method will be via sewer connection and treatment at the Bergen County POTW. Alternatively, extracted groundwater will continue to be collected in a 10,000 gallon tank and periodically transported via tanker truck to a commercial facility such as DuPont Environmental Treatment.

The goal of shallow groundwater extraction will be to maintain inward gradients across the slurry wall, except along Peach Island Creek where inward gradients are not possible. It should be noted that the groundwater levels outside the slurry wall are subject to seasonal fluctuations because of the shallow nature of the groundwater. As such, inward gradients over the entire year may not always be observed, particularly during drier periods when the levels are lowest outside the slurry wall. Since these periods are relatively short, they are unlikely to represent material reversal of gradients from the Site. Additional piezometers will be installed along the north, west and south sides of the Site, inside and outside of the slurry wall to monitor hydraulic gradients. Existing monitoring wells and piezometers within the slurry wall that are no longer required will be decommissioned.

6.4 Streambank Enhancements

A sheet pile wall was installed along Peach Island Creek during construction of the Interim Remedy as a temporary structure to facilitate construction of the slurry wall. Because the sheet pile wall began to deflect during construction of the Interim Remedy, a number of H-piles were also installed to stabilize the sheet pile wall. Currently, the sheet pile wall is monitored and exhibits defections from vertical from 10 to 25 degrees over a significant portion of its length. Although there have been no substantive movements since construction of the interim remedy was completed, a long term solution is necessary to provide permanent stability and improve the aesthetics of the streambank.

Figure 4 illustrates a conceptual approach to enhance the streambank along Peach Island Creek. In general, the area between the slurry wall and Peach Island Creek will be cut back to a stable slope configuration and the excavated material will be used as grading fill below the cover system. The existing sheet pile wall will be cut off at approximately the mud line of Peach Island Creek and the geomembrane portion of the cover will be extended down the slope and covered with slope stabilization material such as riprap. A significant consideration during design and construction of this remedy element will be to maintain the integrity of the existing slurry wall and to provide an enhanced stream channel.

6.5 Slurry Wall

The slurry wall installed as part of the Interim Remedy will remain in-place and is a key component of the overall OU-2 remedy. The wall provides a double containment system consisting of a soil-bentonite slurry barrier with an integral HDPE geomembrane, keyed into the underlying clay layer. The slurry wall functions as a barrier to mitigate lateral migration and its effectiveness is confirmed by shallow groundwater monitoring wells outside the slurry wall which indicate no lateral migration of contamination from the fill. The slurry wall, in conjunction with the proposed cover system, will effectively isolate the fill zone.

6.6 Institutional Controls

A Deed Notice will be placed on the property as part of the OU-2 remedy. The deed restriction will establish an institutional control so that future residential use of the Site is precluded, along with any other activities that prejudice the integrity and/or operation of the final remedy. The Deed Notice will also ensure that access is permanently available for operation, maintenance and monitoring of the remedy.

6.7 Post-Construction Monitoring and Maintenance

Operation, maintenance and monitoring requirements for the remedy will be developed during design to ensure the integrity of the remedial measures. Monitoring will include regular inspections for each component of the remedy together with quarterly water level measurements to evaluate hydraulic gradients, and off-property shallow groundwater quality monitoring. The frequency and scope of monitoring may be reduced over time, subject to the agreement of USEPA.

6.8 Sludge Area Excavation/Off-Site Treatment Alternative

Sludge area excavation would be performed as generally described in Section 5.3. The extent of excavation would be determined by the sludge extent as defined in Figure 1 and by the feasibility of installing the internally braced excavation system (IBES). As noted in Section 5.2, significant difficulties were encountered during installation of sheet piles through the fill along Peach Island Creek due to the presence of massive debris. It is likely, therefore, that the extent of excavation will be less than for in-situ treatment due to the fact that sheet piles likely cannot be installed to encompass the same treatment area.

Sludge material, after addition and mixing of required stabilization agents, will be transported off-Site via truck. Clean fill material will be imported in the same way, and compacted in lifts in the excavations to provide a stable subgrade for final capping of the area.

6.9 Sludge Area In-Situ Treatment Alternative

In-Situ treatment of the sludge area will be performed using the following technologies:

- Air Stripping
- Solidification/stabilization

A system comprising of a backhoe or another similar truck mounted mechanism will be used to implement both treatment technologies. Air stripping via soil mixing with air injection will be performed using large augers or paddles covered by a shroud. The soil/sludge will be mixed for approximately 2 hours consistent with the treatability study. To enhance volatilization and removal of contaminants (primarily VOCs), air will be introduced and a negative pressure will be maintained within the shroud to capture VOCs released during mixing. Recovered VOCs will be treated using appropriate treatment technologies such as vapor phase activated carbon or a catalytic oxidizer. The air treatment method will be determined during the design in order to meet emission standards. After completion of air stripping, cement and lime will be used as the solidification/stabilization agent and applied to the sludge at a rate of approximately 10 percent cement and 10 percent lime by weight. These reagents will be introduced and mixed using augers or paddles to achieve thorough homogenization, consistent with the treatability study.

The limits of the sludge area based on the Focused Feasibility Study Investigation are shown on Figure 1. It is anticipated that air stripping and stabilization/solidification will extend horizontally beyond the limits of the identified sludge area on the order of 5 feet to ensure treatment of the entire sludge area. However, the actual extent of treatment beyond the sludge area will depend on subsurface conditions encountered since the large debris present outside the sludge area precludes treatment. Treatment will extend a minimum of 2 feet into natural ground surface, and approximately 10-18 feet below existing ground surface. Mixing will be carried out on an overlapping grid pattern to ensure effective treatment of the entire sludge area.

7.0 EVALUATION CRITERIA

The selection of a remedial alternative is based on an evaluation of nine criteria established in the NCP. Two criteria (state acceptance and community acceptance) will not be fully evaluated in this report because they will be addressed during the public comment period. The remaining seven criteria are described below.

Threshold criteria are those which must be met in order for a remedy to be eligible for selection. The two threshold criteria are described below.

- Overall Protection of Human Health and the Environment

  Under this criterion, an alternative should be assessed to determine whether it can adequately protect human health and the environment, in both the short-term and long-term, from unacceptable risks posed by hazardous substances, pollutants or contaminants present at the Site, by eliminating, reducing or controlling exposures to levels established during development of remediation goals. This criterion is an overall assessment of protection based on a composite of factors assessed under other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

- Compliance with ARARs

  This criterion evaluates whether and how the alternative attains applicable or relevant and appropriate requirements under federal environmental laws and state environmental or facility siting laws, or provides grounds for invoking the legal waiver of such requirements.

Primary Balancing criteria are used to weigh the alternatives in order to determine the best selection for the Site. The 5 balancing criteria are described below.

- Short-Term Effectiveness

  This criterion evaluates the impacts of the alternative during implementation with respect to human health and the environment. The short-term impacts of an alternative shall be assessed considering: short-term risks that might be posed to the community during implementation of an alternative; potential impacts on workers during remedial action and the effectiveness and reliability of protective measures; potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation.

- Reduction of Toxicity, Mobility, and Volume Through Treatment

  Under this criterion, the degree to which an alternative employs recycling or treatment that reduces toxicity, mobility, or volume shall be assessed, including how treatment is used to address the principal threats posed at the Site. Factors that shall be considered include: the treatment or recycling processes; the alternatives employed and the materials they will treat; the amount of hazardous substances, pollutants or contaminants that will be destroyed, treated, or recycled; the degree of expected reduction in toxicity, mobility or volume of the waste due to treatment or recycling and the specification of which reduction(s) are occurring; the degree to which the treatment is irreversible; the type and quantity of residuals that will remain following treatment considering the persistence, toxicity, mobility, and propensity to bio-accumulate of such hazardous substances and their constituents; and the degree to which treatment reduces the inherent hazards posed by principal threats at the Site.

- Long-Term Effectiveness and Permanence

  Under this criterion, an alternative shall be assessed for the long-term effectiveness and permanence it affords, along with the degree of uncertainty that the alternative will prove successful. Factors that shall be considered, as appropriate, include: the magnitude of residual risk remaining from untreated waste or treatment residuals remaining at the conclusion of the remedial activities; and the adequacy and reliability of controls such as containment systems and institutional controls that are necessary to manage treatment residuals and untreated waste.

- Implementability

  This criterion addresses the technical and administrative feasibility of implementing the alternative as well as the availability of various services and materials required.

- Cost

  Cost items evaluated include capital and operation and maintenance expenditures to implement the alternative, presented as a present worth analysis.

Modifying criteria include State acceptance and Community acceptance. Some discussion of identified and anticipated community concerns is included herein, however further comments from the State and the community will be considered by the USEPA when determining the selected remedial alternative for the Site.

8.0 EVALUATION OF SOURCE CONTROL ALTERNATIVES

8.1 Sludge Area Excavation/Off-Site Treatment Alternative

8.1.1 Overall Protection of Human Health and the Environment

The sludge area excavation alternative, when completed, will be protective of human health and the environment and is consistent with potential future remedies for OU-3 (deep groundwater). Short term health risks during construction of this alternative are, however, significant, as discussed in Section 8.1.3 below. Excavation of the sludge and off-Site treatment will address the principal threat that accounts for about 97% of the total estimated carcinogenic risk at the Site (Clements, 1990). Implementation of the cover system will prevent dermal contact with and incidental ingestion of soil contaminants thereby eliminating the unacceptable risk associated with these pathways. The cover will also eliminate fugitive dust emissions, and prevent erosion and potential discharge of contaminants to Peach Island Creek surface water and reduce infiltration into the fill zone.

The slurry wall, in conjunction with the shallow groundwater extraction system, provides hydraulic containment within the fill zone, preventing the lateral migration of contaminants. Extracted groundwater will be treated in compliance with ARARs. Deed restrictions and long-term maintenance of the remedy will ensure permanent protection of human health and the environment.

8.1.2 Compliance with ARARs

Section 121(d) of CERCLA requires that remedial actions at CERCLA sites attain legally applicable or relevant and appropriate cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law, which are collectively referred to as "ARARs", unless such ARARs are waived under CERCLA § 121(d)(4).

"Applicable" requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. "Relevant and appropriate" requirements are those requirements that, while not legally "applicable", address problems or situations sufficiently similar to those encountered at the Site that their use is well suited to the particular site. Only those State standards that are promulgated, are identified by the State in a timely manner, and are more stringent than federal requirements may be applicable or relevant and appropriate. ARARs may relate to the substances addressed by the remedial action (chemical-specific), to the location of the Site (location-specific), or the manner in which the remedial action is implemented (action-specific).

In addition to applicable or relevant and appropriate requirements, the lead agency may, as appropriate, identify other advisories, criteria, or guidance to be considered for a particular release. The "to be considered" (TBC) category consists of advisories, criteria, or guidance that were developed by USEPA, other federal agencies or states that may be useful in developing CERCLA remedies.

The ARARs identified in this FFS relate only to the response actions addressed in this FFS for the Site. The following discussion identifies the chemical, location and action-specific ARARs and TBCs identified relating to the sludge area excavation/off-Site treatment alternative.

8.1.2.1 Chemical-Specific ARARs

Chemical-specific ARARs set health or risk based concentration limits in various environmental media for specific contaminants. They are used to establish cleanup goals for remedial action in order to protect human health and the environment. Generally, state ARARs are used where they are at least as or more stringent than the federal ARAR-equivalent. As such, where equivalent federal and state ARARs exist, only the state ARARs are cited.

- New Jersey Groundwater Quality Standards (N.J.A.C. 7:9-6) provide standards for groundwater with classifications levels 1 through III. The New Jersey Appellate Division has recently invalidated these standards (Federal Pacific Electric Co. v NJDEP) and so they are no longer ARAR but are classified as "To Be Considered" (TBC). It is anticipated that groundwater in the fill zone will either be classified as Class IIIB (groundwater not suitable for conversion to potable use) or an indefinite Classification Exception Area[5] (CEA) will be established in accordance with N.J.A.C. 7:9-6.
- National Primary Drinking Water Standards (40 CFR Part 141) establish primary maximum contaminant levels (MCLs) for public water systems, measured at the tap, based on protection of health and consideration of technical and economic feasibility. The MCLs and non-zero MCL goals are used as ARARs for groundwater that could be used for potable purposes.

[5] CEAs are established by NJDEP for localized areas, associated with regulated contaminated sites, where standards are not and will not be met.

- The NJDEP Soil Cleanup Criteria (N.J.A.C. 7:26D) are unpromulgated criteria and as such are not ARAR but are classified as "To Be Considered" (TBC). As noted in NJDEP's *Guidance Document for the Remediation of Contaminated Soil* (January 1998) "The Soil Cleanup Criteria are to be used as indicators that a cleanup might be required." In the present case, comparison of Site data to the non-residential criteria confirms the need for remedial action.

8.1.2.2 Action Specific ARARs

Action-specific ARARs set performance, design, or operating standards for specific remedial actions. Generally, state ARARs are used where they are at least as or more stringent than the federal ARAR-equivalent. As such, where equivalent federal and state ARARs exist, only the state ARARs are cited. The remedial design will be required to comply with the potential ARARs listed below.

On-Site actions (i.e., within the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action) need to comply only with the substantive aspects of ARARs, not with the corresponding administrative requirements (e.g., consultation, issuance of permits, documentation, record keeping and enforcement).

- New Jersey Ambient Air Quality Standards (N.J.A.C. 7:27-13) provide maximum concentrations of suspended particulate matter in air, sulfur dioxide, carbon monoxide, ozone, lead, and nitrogen oxide. During remedial activities at the Site, the contractor will need to control and treat the emissions to comply with these standards.

- Clean Water Act (Section 402) NPDES (40 CFR Parts 122-125) provides effluent standards for direct and indirect discharges to surface water and groundwater. The groundwater remedy includes maintenance of the slurry wall around the Site that prevents discharge into the surrounding surface water bodies, and the off-Site treatment facility for extracted groundwater will also comply with these requirements.

- Well Drilling and Pump Installers Licensing Act (N.J.A.C. 7:8-3.11) requires that all drilling, boring and well installation activities in the State of New Jersey must not be performed until the state has issued permits for such activities.

- Sealing and abandonment of wells that are not required as part of the remedy will be performed in accordance with N. J. A. C. 7:9-9.1-9.4.

- Clean Air Act National Emissions Standards for Hazardous Waste Air Pollutants (NESHAPS, 40 CFR Pt 61) establishes emissions standards for various hazardous contaminants. Remediation of the sludge material will volatilize VOCs and the resulting vapors must be captured and treated to meet these emission standards.

- New Jersey Hazardous Waste Facility Design and Operation Requirements (N.J.A.C. 7:26-10.4 to 10.8, 11.6, and 11.7) has design and operation standards that are relevant and appropriate for the cap proposed for the Site.

- Department of Transportation Rules for the Transportation of Hazardous Materials (49 CFR Parts 107, 171.1 through 171.500) specify the procedures for packing, labeling manifesting, and transporting hazardous materials from point of generation to the point of treatment, storage or disposal.

- New Jersey Hazardous Waste Hauler Responsibilities (N.J.A.C. 7:26-7) include waste labeling, record keeping, and manifesting. These requirements will apply for any transport of hazardous waste to an off-Site treatment or disposal facility.

- Soil Erosion and Sediment Control Plan Certification (N.J.S.A. 4:24-1) is required for projects which disturb more than 5,000 square feet of surface area of land. During remedial design, a Soil Erosion and Sediment Control Plan will be prepared in conformance with these requirements.

- New Jersey Hazardous Waste Facility Closure/Post Closure Requirements (N.J.A.C. 7:26) provide general and facility-specific closure/post-closure requirements including final cover requirements for contaminated soil. The proposed cap design will comply with the substantive requirements of these regulations, as appropriate.

- Occupational Safety and Health Standards for Hazardous Response Contractors (29 CFR 1926) establish worker health and safety program goals for CERCLA cleanup projects.

- Final Rule for disposal of PCBs (40 CFR Parts 750 & 761) would apply to the treatment and disposal of sludge material off-Site.

8.1.2.3 Location-Specific ARARs

Location-specific ARARs set restrictions on the conduct of remedial activities in particular locations (e.g., wetlands and floodplains). Generally, state ARARs are used where they are at least as or more stringent than the federal ARAR-equivalent. As such, where equivalent federal and state ARARs exist, only the State ARARs are cited.

- Executive Orders on Floodplain Management and Wetlands Protection (CERCLA Floodplain and Wetlands Assessments-EO 11988 and 11990) require federal agencies to assess potential effects of remediation on surrounding wetlands and in the floodplain.

- General standards for Permitting Stream Encroachment (N.J.S.A 58:16A-50 and N.J.A.C. 7:8-3.15) pertains to soil erosion and sediment movements caused by construction activities along a stream or within a floodplain.

- Hackensack Meadowlands Development Commission (HMDC) Zoning/Land Use/ Environmental Requirements (N.J.A.C. 19:4) allows the HMDC to review and regulate construction plans to ensure the protection of wetlands and estuary areas.

- The Freshwater Wetlands Protection Act of 1987 (N.J.S.A. 13:98-1) requires permitting of activities in and around freshwater wetlands including removal, excavation, disturbance or dredging of soil, disturbance of the water table, dumping, discharging or filling, and driving of pilings.

This remedy will improve and expand the present stream channel and, as such, compliance with the potential ARARs identified above is expected.

8.1.3 Short-Term Effectiveness

Significant short term risks are associated with the excavation/of-Site disposal alternative even with all available controls in place.

Total VOCs have been detected in the sludge at 36,000 mg/kg (3.6%) and include vinyl chloride, benzene, and chloroform (Golder, 1997b). Further, during the FFS drilling investigations, vinyl chloride was detected at 10 ppm in the worker breathing zone together with photoionization detector (PID) readings as high as 450 ppm. As a result, all work associated with this investigation was completed in Level B protective equipment (supplied air). Based upon this field experience, which was limited to small diameter borings, and the results of VOC analytical data collected during the investigation, there is potential for very significant risk associated with large-scale excavation of the sludge material. In particular, this risk is associated with the inhalation, by unprotected off-Site workers and pedestrians on the streets that bound the Site, of VOCs released during the excavation.

To evaluate the health risks (cancer and non-cancer) associated with the excavation of the sludge material, air modeling was performed to predict the maximum concentration of specific VOCs anticipated at the Site perimeter. The results from the air modeling were then used to evaluate risk to off-Site workers and the general public via the potential exposure inhalation pathway. The air modeling and risk assessment used standard EPA air models (T-screen and ISCST3) and risk assessment calculations (USEPA, 1989) and are presented in detail in Appendices B and C, respectively. Calculations were performed addressing excavation with and without the enclosure structure to control emissions.

Absent an enclosed structure, the cancer risk to off-Site workers[6] exposed through inhalation of VOCs, is one-in-one-hundred (1×10^{-2}) and the Hazard Index (HI) for non-cancer health effects is 1,800. The cancer risk to pedestrians[7] under the same conditions, is one-in-one-thousand (1×10^{-3}) and the HI is 225. These calculations indicate unacceptable risks and confirm the need for rigorous controls.

For the case of work conducted within an enclosed structure, risk calculations were based on a 2 hour release occurring at some time during the 50 day excavation period. In this case, the cancer risk to off-Site workers exposed through inhalation of VOCs is one-in-one hundred thousand (1×10^{-5}) and the HI is 2.2. The cancer risk to pedestrians under the same condition is six-in-one-million (6×10^{-6}) and the HI is 1.1. These calculations indicate that, even in the presence of an enclosed structure, the risks to off-Site workers and the public are significant.

Other short term risks, that are very significant but which cannot be readily quantified, include the following:

- *Site Worker Health and Safety* – All excavation and sludge handling activities will be performed in Level B personnel protective equipment. In addition, a large enclosed structure would be required to contain emissions from the excavation to protect off-Site workers and the public. Additional VOC, carbon monoxide, and particulates would be emitted by heavy equipment (diesel engine exhaust) operating within the enclosed structure, which would exacerbate health and safety risks for workers within the enclosed structure. The rate of ventilation (and corresponding treatment) would need to be properly sized to prevent buildup of VOC vapors, and prevent buildup of explosive gas mixtures. USEPA has shown that the required ventilation rates can be higher than expected to provide the necessary level of protection (USEPA, 1992). Site personnel working in an enclosed structure, in Level B protective equipment, operating heavy equipment and performing work in crowded, slippery, and reduced visibility conditions are exposed to significantly elevated health and safety risks.

- *Hazardous Waste Transportation* – Excavation will require the off-Site transportation of approximately 3,600 tons of sludge material and 15,000 gallons of PCB contaminated groundwater over 1,500 miles to the nearest available treatment and disposal facilities. USEPA's Transportation Release Model[8] was used to estimate the relative risk associated with the transportation of the sludge material to an off-Site facility for treatment and disposal (see Table 5). The results of this assessment indicate that, based on USEPA statistical data, approximately nine (9) cubic yards (equivalent to the volume of thirty-three 55-gallon drums) of material will be released to the environment en route or in loading and unloading operations. Such an uncontrolled release that could occur in any

[6] Exposure is assumed to be 8 hours per day for 50 days.
[7] Exposure is assumed to be 1 hour per day for 50 days.
[8] This model was previously used in Appendix H of the Feasibility Study that preceded the 1990 ROD. The same assumptions used at that time were used in this assessment, with the exception of the quantity of the material to be transported off-Site.

community during the 1500 mile journey, represents a risk that is substantial and unavoidable. It is estimated that over 200 trucks (each carrying a 17.5-ton load) will be required to transport the sludge material off-Site in addition to several tankers required to transport the PCB contaminated groundwater.

- *Excavation Construction Risk* - Excavation close to the slurry wall (within 10 feet) creates a risk for potential failure of the slurry wall even when an internally braced excavation is used. Failure of the slurry wall would likely produce a release to Peach Island Creek. In addition, the internal bracing system for required excavation stability creates obstructions to excavation that may prevent all of the sludge being removed and/or increase the risk of locally overexcavating and penetrating the clay layer, leading to contaminant release to the fill aquifer.

8.1.4 Reduction of Toxicity, Mobility and Volume through Treatment

Off-Site treatment of the sludge material will reduce the toxicity, mobility and volume of contaminants while satisfying the statutory preference for treatment. Recovery and off-Site treatment of shallow groundwater will reduce the toxicity, mobility, and volume of contaminants in the fill groundwater.

Mobility of contaminants will also be reduced through implementation of the cover and maintenance of the existing slurry wall. The cover will mitigate infiltration into the fill zone and the potential leaching of contaminants. The slurry wall and associated gradient control pumping also mitigate lateral migration of constituents from the fill zone.

8.1.5 Long term Effectiveness and Permanence

This excavation/off-Site treatment alternative provides long-term permanent protection of human health and the environment through the removal of sludge material and removal and treatment of groundwater from the fill. The cover and the slurry wall are proven technologies that provide long-term protection. Both components include double low permeability barrier systems, that significantly enhance long term effectiveness and performance. The shallow groundwater extraction system will require ongoing maintenance to sustain its effectiveness. The proposed stream bank enhancements will provide a long term solution for the Site perimeter along Peach Island Creek.

Operation, monitoring, and maintenance will be regularly conducted to ensure the continued long-term effectiveness of the remedy.

8.1.6 Implementability

Significant implementation challenges are associated with excavation/off-Site disposal elements of this alternative. Technical concerns associated with the implementability of the excavation arise principally from the following factors:

- Inability to reliably control VOC and odor emissions during excavation in an urban area bounded by public streets, thereby placing nearby receptors at significant risk;
- Construction concerns associated with a complex excavation support system required to maintain the integrity of the slurry wall and avoid potential for migration of contaminants to the underlying till aquifer;
- Serious concerns for worker health and safety as a result of having to work in an enclosed structure, in Level B protective equipment, operating heavy equipment in crowded, slippery, and reduced visibility conditions;
- Transportation of 200 truck loads of hazardous material over 1500 miles to the nearest available disposal facility; and,
- Limitations on the rate of acceptance of sludge at the disposal facility (to maintain compliance with the treatment facility permit) will extend the field work program.

Overall, no technical or administrative problems associated with the other elements of this alternative are envisioned.

8.1.7 Cost

Table 6 summarizes the costs associated with this alternative. The estimated capital cost is $13.9 million and O&M costs are estimated at $180,000 per year. The total present worth cost for this alternative, including 30 years of O&M, is approximately $16.7 million. The sludge material and groundwater will require off-Site treatment by incineration due to the concentration of PCBs at a cost of approximately $5.1 million. Details of the transportation and disposal costs associated with the sludge material, including vendor quotes, are presented in Appendix E.

8.2 Sludge Area In-Situ Treatment Alternative

8.2.1 Overall Protection of Human Health and the Environment

The in-situ treatment alternative will be protective of human health and the environment and is consistent with potential future remedies for OU-3 (deep groundwater). In-situ treatment of sludge will address the principal threat that accounts for about 97% of the total estimated carcinogenic risk at the Site (Clements, 1990). Implementation of the cover system will prevent dermal contact with and incidental ingestion of soil contaminants thereby eliminating the unacceptable risk associated with these pathways. The cover will also eliminate fugitive dust emissions, and prevent erosion and potential discharge of contaminants to Peach Island Creek surface water and reduce infiltration into the fill zone.

The slurry wall, in conjunction with the shallow groundwater extraction system, provides hydraulic containment within the fill zone, preventing the lateral migration of contaminants. Extracted groundwater will be treated in compliance with ARARs. Deed restrictions and long-term maintenance of the remedy will ensure permanent protection of human health and the environment.

8.2.2 Compliance with ARARs

The ARARs that apply to the in-situ treatment alternative are essentially the same as for the excavation/off-Site treatment alternative, except for the action-specific ARARs related to off-Site sludge disposal that do not apply to the in-situ treatment alternative.

The in-situ treatment alternative is expected to comply with ARARs in the same manner as the excavation alternative.

8.2.3 Short-Term Effectiveness

The in-situ treatment alternative reduces the potential environmental impacts and short term risks to workers and off-Site receptors to the maximum extent practicable, by minimizing the level of excavation and off-Site waste transportation required to implement the remedy. Excavations will be required to implement the stream bank enhancements, install piping for the groundwater extraction system, and to locally grade the Site prior to installation of the cover. Additional subsurface work will be required to install new groundwater extraction wells and piezometers and implement the sludge area treatment. Engineering controls, including limiting areas of open excavation, will need to be implemented during construction to control fugitive dust and volatile emissions into the surrounding environment. Air stripping in the sludge area will be conducted under a shroud and vacuum and the vapors will be treated prior to discharge to the atmosphere. Appropriate health and safety measures will be taken to protect construction workers. Perimeter monitoring will be conducted to assure the effectiveness of engineering controls.

8.2.4 Reduction of Toxicity, Mobility and Volume through Treatment

In-situ treatment of the sludge will reduce the toxicity, mobility and volume of contaminants in the fill zone while satisfying the statutory preference for treatment. In-situ air stripping will reduce the volume and toxicity of organic constituents. Stabilization/solidification will treat the principal threat volatile organic and inorganic substances, including PCBs, through microencapsulation and will reduce the mobility of contaminants. Stabilization/solidification will also incorporate any free liquid within the sludge into the mineral matrix and reduce its mobility. Recovery and off-Site treatment of shallow groundwater will reduce the toxicity, mobility, and volume of contaminants in the fill groundwater.

Mobility of contaminants will also be reduced through implementation of the cover and maintenance of the existing slurry wall. The cover will mitigate infiltration into the fill zone and the potential leaching of contaminants. The slurry wall and associated gradient control pumping also mitigate lateral migration of constituents from the fill zone.

8.2.5 Long term Effectiveness and Permanence

The in-situ treatment alternative provides long-term permanent protection of human health and the environment through the removal and encapsulation of constituents in the sludge area and removal and treatment of groundwater from the fill. Solidification/Stabilization is an established technology that has been used for the past 20 years to treat a variety of wastes within the Superfund program. Since 1982 S/S has been used at approximately 167 sites (ex and in-situ) of which 28 sites include in-situ S/S (USEPA, 2000). According to the USEPA database (EPA REACH IT, April 2001) there are five Superfund projects that have been successfully completed that involved in-situ S/S for treatment of PCB contaminated soils or sediments and another five sites that are currently in the Pre-Design phase that will also use this technology for treatment of PCBs.

The cover and the slurry wall are proven technologies that provide long-term protection. Both components include double low permeability barrier systems that significantly enhance long term effectiveness and performance. The shallow groundwater extraction system will require ongoing maintenance to sustain its effectiveness. The proposed stream bank enhancements will provide a long term solution for the Site perimeter along Peach Island Creek.

Operation, monitoring, and maintenance will be regularly conducted to ensure the continued long-term effectiveness of the remedy.

8.2.6 Implementability

The in-situ treatment alternative utilizes established practices; the services and materials needed are standard within the industry and readily available. As discussed in Section 3.1, the massive rubble and debris within the fill will interfere with trench excavations and drilling. Emissions of VOCs may impede subsurface construction. These factors, while significant, will not preclude implementation of this alternative. Overall, no technical or administrative problems are envisioned which would adversely affect the construction or schedule for implementation of the alternative or associated long-term operations and maintenance.

8.2.7 Cost

Table 7 summarizes the costs associated with the in-situ treatment alternative. The estimated capital cost is $4.7 million and O&M costs are estimated at $180,000 per year. The total present worth cost for this alternative, including 30 years of O&M, is approximately $7.5 million.

8.3 Comparative Evaluation of Alternatives

The following sections provides a comparative evaluation of the excavation/off-Site treatment alternative and the in-situ treatment alternative.

8.3.1 Overall Protection of Human Health and the Environment

Both alternatives, when completed, will provide a similar degree of protection of human health and the environment and are equally consistent with potential future remedies for OU-3 (deep groundwater). However, the excavation/off-Site treatment alternative poses substantial additional short-term health risks during implementation that are unavoidable.

8.3.2 Compliance with ARARs

Both alternatives can be implemented to achieve equivalent compliance with the chemical-specific, action-specific, and location-specific ARARs identified herein.

8.3.3 Short-Term Effectiveness

The short-term risks associated with the in-situ treatment alternative are modest and readily controlled, while risks associated with the excavation/off-Site disposal alternative are much higher and cannot be readily controlled. Health risk to on-Site workers, off-Site workers and the public are significant during excavation, even with all available controls in place. The risks of contaminant migration during the implementation of the excavation alternative are also greater. Transportation risks associated with the 1,500 mile trip to the nearest available treatment and disposal facility are significant and unique to the excavation alternative.

8.3.4 Reduction of Toxicity, Mobility, and Volume Through Treatment

Both alternatives satisfy the statutory preference for treatment and provide a similar degree of reduction of toxicity and mobility. The removal alternative provides a higher degree of reduction in volume through treatment.

8.3.5 Long-Term Effectiveness and Permanence

Both alternatives provide effective long-term control of the principal threat. The in-situ treatment alternative will remove about 95% of VOCs while immobilizing the remaining VOCs, metals, and PCBs. With the exception of PCBs, the majority of the organics that would be present after treatment of the sludge (based on the treatability study) would be at lower concentrations than elsewhere on-Site. While the removal alternative will permanently remove sludge material from the Site, some material will remain and the long-term effectiveness on a Site-wide basis is expected to be the same for both alternatives.

8.3.6 Implementability

The in-situ treatment alternative is readily implementable while the removal alternative involves serious implementation challenges.

8.3.7 Cost

The total present worth cost (including O&M) of the in-situ treatment alternative remedy and the excavation/off-Site treatment alternative are $7.5 million and $16.7 million, respectively.

8.3.8 Community Acceptance

As noted in Section 7, community acceptance will be formally assessed by USEPA after the public comment period. Nonetheless, it is reasonable to anticipate that the in-situ treatment alternative will be more acceptable to the community for the following reasons:

- Potentially signficant short-term health risks to off-Site workers and the public associated with excavation are avoided;
- Truck traffic through the community (associated with off-Site transport of sludge and import of clean fill) will be much reduced;
- The potential risk of spills of hazardous material during off-Site transportation is avoided, both in the local community and others along the 1,500 mile route to the disposal facility; and,
- The in-situ treatment alternative can be implemented in a shorter time period with greatly reduced effect upon the community in terms of air emissions, odor and visual impact.

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Table 1A
First Operable Unit Soil Chemistry Summary
216 Paterson-Plank Road Site
Shallow Soil (0-2')

Compound	Initial EPA PRG (ppm)	Frequency of Detections	Number of Detections Above PRG	Maximum Concentration (ppm)
Volatiles				
1,1,1-Trichloroethane	184000	1/17	0	2.49
1,1,2,2-Tetrachloroethane	28	1/17	0	0.288
1,1,2-Trichloroethane	100	2/17	0	1.810
1,1-Dichloroethane	200000	2/17	0	64.7
1,1-Dichloroethene	9.6	2/17	0	0.182
1,2-Dichlorobenzene	184000	8/17	0	47.3
1,2-Dichloroethane	62	4/17	0	10.2
1,3-Dichlorobenzene	184000	0/17	0	0.962
2-Butanone (Methyl-ethyl-ketone)	1220000	2/17	0	8.56
Benzene	198	4/17	0	53.9
Chlorobenzene	40000	4/17	0	336
Chloroethane	40000	0/17	0	BMDL
Chloroform	940	4/17	0	17.8
Ethylbenzene	200000	7/17	0	652
Methylene Chloride	760	11/17	0	2.39
Styrene	400000	0/17	0	BMDL
Tetrachloroethene	110	12/17	3	4290
Toluene	400000	8/17	0	3380
Total Xylenes	4000000			
(m) Xylenes		7/17	0	2000
(o+p) Xylenes		9/17	0	1450
trans-1,2-Dichloroethene	40000	5/17	0	0.241
Trichloroethene	520	12/17	1	2060
Vinyl Chloride	3	0/17	0	BMDL
Semivolatiles				
1,2,4-Trichlorobenzene	20000	2/17	0	1.69
2,4-Dichlorophenol	6200	1/17	0	1.102
2,4-Dimethylphenol	40000	2/17	0	1.12
2-Chloronaphthalene		2/17	NA	0.22
2-Chlorophenol	10200	0/17	0	BMDL
2-Nitrophenol		0/17	NA	BMDL
Acenaphthene	122000	9/17	0	2.7
Acenaphthylene	61000	1/17	0	0.56
Anthracene	620000	9/17	0	3.9
Benzidine	0.024	0/17	0	BMDL
Benzo(a)Anthracene	7.8	5/17	0	4.54
Benzo(a)Pyrene	0.78	9/17	9	9.39
Benzo(b)Fluoranthene	7.8	6/17	2	17.7
Benzo(g,h,i)Perylene		7/17	NA	6.95
Benzo(k)Fluoranthene	78	1/17	0	3.79
bis(2-Chloroethyl)ether	5.2	0/17	0	BMDL
bis(2-Ethylhexyl)Phthalate	400	17/17	0	281
Butylbenzylphthalates	400000	8/17	0	86.1
Chrysene	78000	11/17	0	5.5
Di-n-butylphthalate		13/17	NA	71
Di-n-Octyl Phthalate	40000	6/17	0	9.05
Dibenz(a,h)Anthracene	0.78	2/17	1	2.4
Diethylphthalate	1640000	1/17	0	5.09
Dimethyl Phthalate	2000000	0/17	0	BMDL
Fluoranthene	82000	16/17	0	15.3
Fluorene	82000	9/17	0	11.0
Indeno(1,2,3-cd)Pyrene	7.8	7/17	1	12.1
Isophorone	6000	0/17	0	BMDL
N-Nitrosodiphenylamine	1160	3/17	0	2.98
Naphthalene	82000	16/17	0	102
Nitrobenzene	1020	1/17	0	117
Phenanthrene		13/17	NA	23.6
Phenol	50000	4/17	0	58.2
Pyrene	62000	15/17	0	12.7

Table 1A
First Operable Unit Soil Chemistry Summary
216 Paterson-Plank Road Site
Shallow Soil (0-2')

Compound	Initial EPA PRG (ppm)	Frequency of Detections	Number of Detections Above PRG	Maximum Concentration (ppm)
Pesticides				
4,4'-DDE	16.8	0/17	0	BMDL
4,4'-DDT	16.8	0/17	0	BMDL
Aldrin	0.34	3/17	1	57
beta-BHC	3.6	0/17	0	BMDL
Dieldrin	0.36	5/17	5	57
Endosulfan I	102	0/17	0	BMDL
Endosulfan II	102	0/17	0	BMDL
Endrin	620	0/17	0	BMDL
Methoxychlor	10200	0/17	0	BMDL
PCB's				
Aroclor-1242	10-25	11/17	5-4	15000
Aroclor-1248	10-25	4/17	3-1	23
Aroclor-1254	10-25	4/17	1-0	12
Aroclor-1260	10-25	2/17	1-1	48
Total Metals				
Antimony	820	3/17	0	16
Arsenic	3.2	14/17	13 [4]	60
Beryllium	1.34	17/17	1	57.6
Cadmium	1020	17/17	0	95.1
Chromium	10200 (VI)	17/17	0	870
Copper	76000	17/17	0	71600
Cyanide	40000	16/17	0	34
Lead	500 - 1000	17/17	8-2	2750
Mercury	620	17/17	0	21.3
Nickel	40000	15/17	0	39
Selenium	10200	5/17	0	4.9
Silver	10200	7/17	0	6.4
Thallium	144	0/17	0	BMDL
Zinc	620000	17/17	0	4170
Wet Chemistry				
Phenolics (Total)	50000	16/17	0	600
Petroleum Hydrocarbons		17/17	NA	81600

Notes:
1. Initial EPA PRGS taken from a letter dated November 19, 1993 from EPA to Langan Environmental Services.
2. Soil chemistry data taken from the Remedial Investigation Final Report, dated March 1990, by Dames and Moore.
3. BMDL - Below Method Detection Limit.
4. The number of detection of arsenic is reduced to 3 based on background levels of arsenic per NJDEP Draft Soil Clean-up Standards.

Table 1B
First Operable Unit Soil Chemistry Summary
216 Paterson-Plank Road Site
Saturated Fill (5-6')

Compound	Initial EPA PRG (ppm)	Frequency of Detections	Number of Detections Above PRG	Maximum Concentration (ppm)
Volatiles				
1,1,1-Trichloroethane	184000	3/17	0	1770
1,1,2,2-Tetrachloroethane	28	1/17	0	0.703
1,1,2-Trichloroethane	100	1/17	0	15.7
1,1-Dichloroethane	200000	3/17	0	179
1,1-Dichloroethene	9.6	0/17	0	BMDL
1,2-Dichlorobenzene	184000	6/17	0	385
1,2-Dichloroethane	62	4/17	2	290
1,3-Dichlorobenzene	184000	0/17	0	BMDL
2-Butanone (Methyl-ethyl-ketone)	1220000	5/17	0	795
Benzene	198	7/17	0	52.3
Chlorobenzene	40000	6/17	0	258
Chloroethane	40000	0/17	0	BMDL
Chloroform	940	3/17	0	379
Ethylbenzene	200000	15/17	0	529
Methylene Chloride	760	8/17	0	14.9
Styrene	400000	0/17	0	BMDL
Tetrachloroethene	110	12/17	5	1690
Toluene	400000	16/17	0	2410
Total Xylenes	4000000			
(m) Xylenes		16/17	0	1580
(o+p) Xylenes		16/17	0	710
trans-1,2-Dichloroethene	40000	5/17	0	512
Trichloroethene	520	8/17	2	1670
Vinyl Chloride	3	1/17	0	0.0289
Semivolatiles				
1,2,4-Trichlorobenzene	20000	1/17	0	0.350
2,4-Dichlorophenol	6200	0/17	0	BMDL
2,4-Dimethylphenol	40000	3/17	0	10.8
2-Chloronaphthalene		3/17	NA	18.2
2-Chlorophenol	10200	0/17	0	BMDL
2-Nitrophenol		0/17	NA	BMDL
Acenaphthene	122000	8/17	0	21.2
Acenaphthylene	61000	1/17	0	21
Anthracene	620000	7/17	0	86.3
Benzidine	0.024	1/17	1	244
Benzo(a)Anthracene	7.8	5/17	1	84.2
Benzo(a)Pyrene	0.78	7/17	4	108
Benzo(b)Fluoranthene	7.8	6/17	2	164
Benzo(g,h,i)Perylene		5/17	NA	73.3
Benzo(k)Fluoranthene	78	0/17	0	BMDL
bis(2-Chloroethyl)ether	5.2	0/17	0	BMDL
bis(2-Ethylhexyl)Phthalate	400	14/17	0	381
Butylbenzylphthalates	400000	6/17	0	73.6
Chrysene	78000	7/17	0	106
Di-n-butylphthalate		6/17	NA	98.2
Di-n-Octyl Phthalate	40000	5/17	0	19.5
Dibenz(a,h)Anthracene	0.78	0/17	0	BMDL
Diethylphthalate	1640000	0/17	0	28.5
Dimethyl Phthalate	2000000	0/17	0	BMDL
Fluoranthene	82000	13/17	0	176
Fluorene	82000	9/17	0	94.1
Indeno(1,2,3-cd)Pyrene	7.8	4/17	1	86.9
Isophorone	6000	0/17	0	BMDL
N-Nitrosodiphenylamine	1160	1/17	0	0.157
Naphthalene	82000	14/17	0	480
Nitrobenzene	1020	1/17	1	1350
Phenanthrene		9/17	NA	268
Phenol	50000	4/17	0	790
Pyrene	62000	12/17	0	118

Table 1B
First Operable Unit Soil Chemistry Summary
216 Paterson-Plank Road Site
Saturated Fill (5-6')

Compound	Initial EPA PRG (ppm)	Frequency of Detections	Number of Detections Above PRG	Maximum Concentration (ppm)
Pesticides				
4,4'-DDE	16.8	0/17	0	BMDL
4,4'-DDT	16.8	0/17	0	BMDL
Aldrin	0.34	1/17	1	1.2
beta-BHC	3.6	0/17	0	BMDL
Dieldrin	0.36	3/17	2	0.940
Endosulfan I	102	0/17	0	BMDL
Endosulfan II	102	0/17	0	BMDL
Endrin	620	0/17	0	BMDL
Methoxychlor	10200	1/17	0	150
PCB's				
Aroclor-1242	10-25	12/17	4-3	350
Aroclor-1248	10-25	2/17	0	9.7
Aroclor-1254	10-25	3/15	0	3.5
Aroclor-1260	10-25	2/17	0	10
Total Metals				
Antimony	820	4/17	0	38
Arsenic	3.2	15/17	12 (5)	62
Beryllium	1.34	17/17	0	1.3
Cadmium	1020	16/17	0	26
Chromium	10200 (VI)	17/17	0	542
Copper	76000	17/17	0	8600
Cyanide	40000	9/17	0	32
Lead	500 - 1000	17/17	8-5	2810
Mercury	620	16/17	0	13.6
Nickel	40000	17/17	0	116
Selenium	10200	3/17	0	2.1
Silver	10200	1/17	0	40
Thallium	144	0/17	0	BMDL
Zinc	620000	17/17	0	1870
Wet Chemistry				
Phenolics (Total)	50000	15/17	0	683
Petroleum Hydrocarbons		17/17	0	29600

Notes:

1. Initial EPA PRGS taken from a letter dated November 19, 1993 from EPA to Langan Environmental Services.
2. Soil chemistry data taken from the Remedial Investigation Final Report, dated March 1990, by Dames and Moore.
3. BMDL - Below Method Detection Limit.
4. Analyses of saturated soil samples taken from below the water table will be biased high by virtue of groundwater contamination.
5. The number of detection of arsenic is reduced to 3 based on background levels of arsenic per NJDEP Draft Soil Clean-up Standards.

Table 2
Phase IV Treatability Study (Stabilization) Analytical Results
Following 3 days (Before S/S materials added)
216 Paterson-Plank Road Site

Total Constituent Analysis (adjusted for reagent addition)

Parameters	Mixture A' Parent Concentration [ppm]	Mixture A' Conc. [ppm] (without Iron Filings)	Mixture A' Conc. [ppm] (with Iron Filings)	Percent Reduction (without Iron Filings)	Percent Reduction (with Iron Filings)
TCE	6,900	167	338	98%	95%
PCE	5,200	478	650	91%	88%
Total Halogenated Compounds	13,616	829	1,141	94%	92%
Total Non-Halogenated Compounds	9,962	1,345	1,542	86%	85%
Total PCBs	580	767	2,125	*	*
Chloride	9,400	8,222	7,250	13%	23%

Note: An asterisk indicates that the concentrations apparently increased, as such the result is unreliable and likely reflects heterogeneity of the sample matrix.

Total Constituent Analysis

Parameters	Mixture A' Parent Concentration [ppm]	Mixture A' Conc. [ppm] (without Iron Filings)	Mixture A' Conc. [ppm] (with Iron Filings)	Percent Reduction (without Iron Filings)	Percent Reduction (with Iron Filings)
TCE	6,900	150	270	98%	96%
PCE	5,200	430	520	92%	90%
Total Halogenated Compounds	13,616	746	913	95%	93%
Total Non-Halogenated Compounds	9,962	1,211	1,234	88%	88%
Total PCBs	580	690	1,700	*	*
Chloride	9,400	7,400	5,800	21%	38%

Note: An asterisk indicates that the concentrations apparently increased, as such the result is unreliable and likely reflects heterogeneity of the sample matrix.

Table 2
Phase IV Treatability Study (Stabilization) Analytical Results
Following 3 days (Before S/S materials added)
216 Paterson-Plank Road Site

Total Constituent Analysis (adjusted for reagent addition)

Parameters	Mixture B' Parent Concentration [ppm]	Mixture B' Conc. [ppm] (without Iron Filings)	Mixture B' Conc. [ppm] (with Iron Filings)	Percent Reduction (without Iron Filings)	Percent Reduction (with Iron Filings)
TCE	9,100	637.5	414.3	93%	95%
PCE	6,100	1,225.0	685.7	80%	89%
Total Halogenated Compounds	17,940	2,129	1,303	88%	93%
Total Non-Halogenated Compounds	13,394	2,814	1,777	79%	87%
Total PCBs	600	1,500.0	1,714	*	*
Chloride	10,000	9,625	8,714	4%	13%

Note: An asterisk indicates that the concentrations apparently increased, as such the result is unreliable and likely reflects heterogeneity of the sample matrix.

Total Constituent Analysis

Parameters	Mixture B' Parent Concentration [ppm]	Mixture B' Conc. [ppm] (without Iron Filings)	Mixture B' Conc. [ppm] (with Iron Filings)	Percent Reduction (without Iron Filings)	Percent Reduction (with Iron Filings)
TCE	9,100	510.0	290.0	94%	97%
PCE	6,100	980.0	480.0	84%	92%
Total Halogenated Compounds	17,940	1,703	912	91%	95%
Total Non-Halogenated Compounds	13,394	2,252	1,244	83%	91%
Total PCBs	600	1,200.0	1,200.0	*	*
Chloride	10,000	7,700	6,100	23%	39%

Note: An asterisk indicates that the concentrations apparently increased, as such the result is unreliable and likely reflects heterogeneity of the sample matrix.

Table 3
Phase IV Treatability Study (Stabilization) Analytical Results
Following 28 days (after curing period for S/S Materials)
216 Paterson-Plank Road Site

Total Constituent Analysis (adjusted for reagent addition)

Parameters	Mixture A' Parent Concentration [ppm]	Mixture A' Conc. [ppm] (10% Cement without Iron Filings)	Mixture A' Conc. [ppm] (10% Cement with Iron Filings)	Percent Reduction (10% Cement without Iron Filings)	Percent Reduction (10% Cement with Iron Filings)
TCE	6,900	18.9	175.0	100%	97%
PCE	5,200	133.3	425.0	97%	92%
Total Halogenated Compounds	13,616	238	729	98%	95%
Total Non-Halogenated Compounds	9,962	558	1,178	94%	88%
Total PCBs	580	500	475	14%	18%
Total Pesticides	0	0	0	-	-
Total Arsenic	12	16	44	*	*
Total Lead	810	1,222	1,200	*	*
Chloride	9,400	6,333	3,750	33%	60%

Note: An asterisk indicates that the concentrations apparently increased, as such the result is unreliable and likely reflects heterogeneity of the sample matrix.

Total Constituent Analysis

Parameters	Mixture A' Parent Concentration [ppm]	Mixture A' Conc. [ppm] (10% Cement without Iron Filings)	Mixture A' Conc. [ppm] (10% Cement with Iron Filings)	Percent Reduction (10% Cement without Iron Filings)	Percent Reduction (10% Cement with Iron Filings)
TCE	6,900	17	140	100%	98%
PCE	5,200	120	300	98%	94%
Total Halogenated Compounds	13,616	214	583	98%	96%
Total Non-Halogenated Compounds	9,962	502	943	95%	91%
Total PCBs	580	450	380	22%	34%
Total Pesticides	0	0	0	-	-
Total Arsenic	12	14	35	*	*
Total Lead	810	1,100	960	*	*
Chloride	9,400	5,700	3,000	39%	68%

Note: An asterisk indicates that the concentrations apparently increased, as such the result is unreliable and likely reflects heterogeneity of the sample matrix.

Table 3
Phase IV Treatability Study (Stabilization) Analytical Results
Following 28 days (after curing period for S/S Materials)
216 Paterson-Plank Road Site

Total Constituent Analysis (adjusted for reagent addition)

Parameters	Mixture B' Parent Concentration [ppm]	Mixture B' Conc. [ppm] (10% Cement/10% Lime without Iron Filings)	Mixture B' Conc. [ppm] (10% Cement/10% Lime with Iron Filings)	Percent Reduction (10% Cement/10% Lime without Iron Filings)	Percent Reduction (10% Cement/10% Lime with Iron Filings)
TCE	9,100	45.0	58.6	100%	99%
PCE	6,100	287.5	242.8	95%	96%
Total Halogenated Compounds	17,940	434.6	395.7	98%	98%
Total Non-Halogenated Compounds	13,394	931	737	93%	94%
Total PCBs	600	487.5	414.3	19%	31%
Total Pesticides	0	0	0	-	-
Total Arsenic	11	16	47	*	*
Total Lead	750	988	843	*	*
Chloride	10,000	5,250	8,290	48%	17%

Note: An asterisk indicates that the concentrations apparently increased, as such the result is unreliable and likely reflects heterogeneity of the sample matrix.

Total Constituent Analysis

Parameters	Mixture B' Parent Concentration [ppm]	Mixture B' Conc. [ppm] (10% Cement/10% Lime without Iron Filings)	Mixture B' Conc. [ppm] (10% Cement/10% Lime with Iron Filings)	Percent Reduction (10% Cement/10% Lime without Iron Filings)	Percent Reduction (10% Cement/10% Lime with Iron Filings)
TCE	9,100	36.0	41.0	100%	100%
PCE	6,100	100.0	73.0	98%	99%
Total Halogenated Compounds	17,940	347.7	277.0	98%	98%
Total Non-Halogenated Compounds	13,394	745	516	94%	96%
Total PCBs	600	390.0	290.0	35%	52%
Total Pesticides	0	0	0	-	-
Total Arsenic	11	13	33	*	*
Total Lead	750	790	590	*	21%
Chloride	10,000	4,200	5,800	58%	42%

Note: An asterisk indicates that the concentrations apparently increased, as such the result is unreliable and likely reflects heterogeneity of the sample matrix.

Table 4
Phase IV Treatability Study (Stabilization) Analytical Results
Following 28 days (after curing period for S/S Materials)
216 Paterson-Plank Road Site

SPLP Analysis (adjusted for reagent addition)

Parameters	Mixture A' Parent Concentration [ppm]	Mixture A' Conc. [ppm] (10% Cement without Iron Filings)	Mixture A' Conc. [ppm] (10% Cement with Iron Filings)	Percent Reduction (10% Cement without Iron Filings)	Percent Reduction (10% Cement with Iron Filings)
TCE	87	2.90	0.15	97%	100%
PCE	15	4.00	0.84	73%	94%
Total Halogenated Compounds	131.7	8.6	1.4	93%	99%
Total Non-Halogenated Compounds	101.0	15.9	4.2	84%	96%
Total PCBs	0.058	0.002	0.0007	96%	99%
Total Pesticides	0	0	0	-	-
Total Arsenic	0.027	0.016	0.016	42%	40%
Total Lead	0.94	0	0	100%	100%

SPLP Analysis

Parameters	Mixture A' Parent Concentration [ppm]	Mixture A' Conc. [ppm] (10% Cement without Iron Filings)	Mixture A' Conc. [ppm] (10% Cement with Iron Filings)	Percent Reduction (10% Cement without Iron Filings)	Percent Reduction (10% Cement with Iron Filings)
TCE	87	2.6	0.12	97%	100%
PCE	15	3.6	0.67	76%	96%
Total Halogenated Compounds	131.7	7.75	1.14	94%	99%
Total Non-Halogenated Compounds	101.0	14.3	3.3	86%	97%
Total PCBs	0.058	0.002	0.0005	97%	99%
Total Pesticides	0	0	0	-	-
Total Arsenic	0.027	0.014	0.013	48%	52%
Total Lead	0.94	0	0	100%	100%

Table 4
Phase IV Treatability Study (Stabilization) Analytical Results
Following 28 days (after curing period for S/S Materials)
216 Paterson-Plank Road Site

SPLP Analysis (adjusted for reagent addition)

Parameters	Mixture B' Parent Concentration [ppm]	Mixture B' Conc. [ppm] (10% Cement/10% Lime without Iron Filings)	Mixture B' Conc. [ppm] (10% Cement/10% Lime with Iron Filings)	Percent Reduction (10% Cement/10% Lime without Iron Filings)	Percent Reduction (10% Cement/10% Lime with Iron Filings)
TCE	130	1.38	1.43	99%	99%
PCE	55	2.75	3.14	95%	94%
Total Halogenated Compounds	228.7	4.9	5.9	98%	97%
Total Non-Halogenated Compounds	171.5	9.6	13.5	94%	92%
Total PCBs	0.051	0.0008	0.0017	99%	97%
Total Pesticides	0	0	0	-	-
Total Arsenic	0.055	0.018	0.014	68%	75%
Total Lead	1.6	0.21	0.137	87%	91%

SPLP Analysis

Parameters	Mixture B' Parent Concentration [ppm]	Mixture B' Conc. [ppm] (10% Cement/10% Lime without Iron Filings)	Mixture B' Conc. [ppm] (10% Cement/10% Lime with Iron Filings)	Percent Reduction (10% Cement/10% Lime without Iron Filings)	Percent Reduction (10% Cement/10% Lime with Iron Filings)
TCE	130	1.1	1.0	99%	99%
PCE	55	2.4	2.5	96%	95%
Total Halogenated Compounds	228.7	3.92	4.14	98%	98%
Total Non-Halogenated Compounds	171.5	7.7	9.4	96%	94%
Total PCBs	0.051	0.0006	0.0012	99%	98%
Total Pesticides	0	0	0	-	-
Total Arsenic	0.055	0.014	0.010	75%	82%
Total Lead	1.6	0.017	0.096	99%	94%

Table 5
Risk Analysis for Sludge Transportation
216 Paterson Plank Road Site
Carlstadt, New Jersey

Road Type	Container Type	Number of Miles Shipped	Total Volume Shipped *(cy)*	Quantity per Shipment *(cy)*	Number of Shipments	Releasing Vehicle Accident Rate *(accident/truck-mile)*	Expected Fraction Released en Route *(cy/cy/mile)*	Total Expected Releases *(cy)*	Total Fractions Released at Terminal Pts. *(cy/cy/shipment)*	Total Expected Releases at Terminal Pts. *(cy)*	Total Releases Expected *(cy)*
Interstate *(NJ To Texas)*	7 *Metal Drums*	1500 *3000 round trip*	2400	20	206	1.30E-07	2.40E-06	8.64E+00	2.90E-04	**6.96E-01**	**9.34E+00**

400065

TABLE 6
SLUDGE EXCAVATION/OFF-SITE TREATMENT ALTERNATIVE
COST ESTIMATE
216 PATERSON-PLANK ROAD SITE

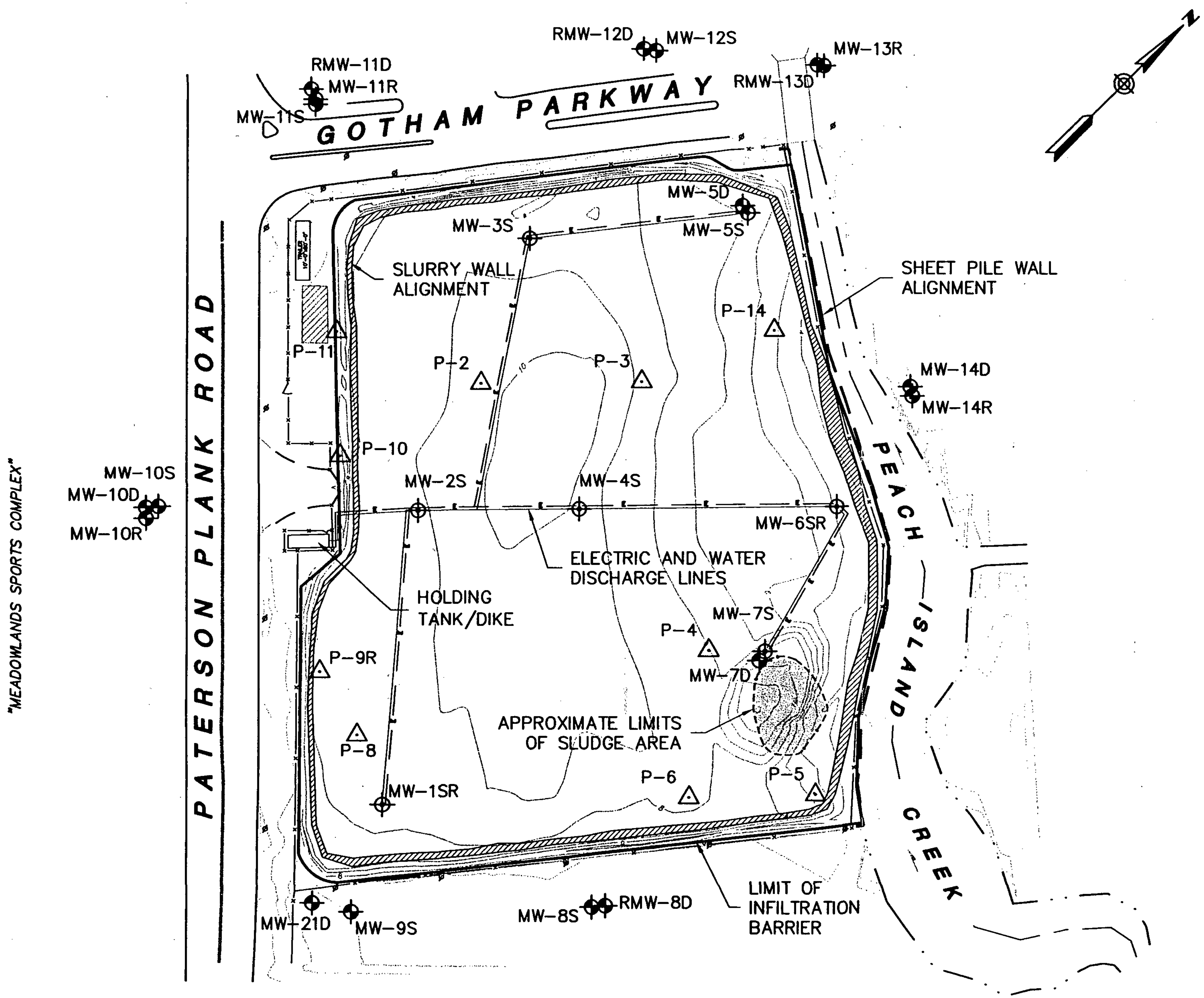
ACTIVITY	ACTIVITY COST
Final Cap	
Grading/Subgrade	$375,000
Geosynthetics	$195,000
Asphalt Pavement/Subbase	$885,000
Surface Water Controls	$60,000
Subtotal	**$1,515,000**
Streambank Enhancement	
Excavation/Remove Wall	$61,000
Slope Cover System	$37,000
Subtotal	**$98,000**
Groundwater Extraction & Monitoring	
Extraction Wells, Pumps, Fittings	$100,000
Conveyance System	$72,000
Electrical	$160,000
Piezometer Installation/Modification	$20,000
Abandon Existing Extraction System & Wells	$25,000
Subtotal	**$377,000**
Sludge Area Removal	
Site Preparation	$25,000
Containment System Protection - Sheet Pile Wall	$300,000
Excavation/Clean Fill	$220,000
Air Handling (Enclosed Structure and Air Emission Treatment)	$600,000
Transportation and Disposal (Sludge and Groundwater)	$5,088,000
Subtotal	**$6,233,000**
General	
Mobilization/Demobilization	$100,000
Field Engineering/Surveying/E&S Controls	$25,000
Health & Safety Monitoring	$90,000
Bonding	$250,000
Building Demolition	$35,000
Subtotal	**$500,000**
CAPITAL COST TOTAL	**$8,723,000**
CONTINGENCY (30%)	**$2,616,900**
CONSTRUCTION OVERSIGHT/QA (15%)	**$1,308,450**
ENGINEERING DESIGN (15%)	**$1,308,450**
30 YEARS OPERATION & MAINTENANCE (NPV)	**$2,800,000**
(including off-site groundwater treatment and 30% contingency)	
TOTAL NET PRESENT WORTH COST	**$16,756,800**

Notes: 1. Cap costs are based on Asphalt option.
2. Discount rate for present worth calculation 5%.

TABLE 7
IN-SITU TREATMENT ALTERNATIVE
COST ESTIMATE
216 PATERSON-PLANK ROAD SITE

ACTIVITY	ACTIVITY COST
Final Cap	
Grading/Subgrade	$375,000
Geosynthetics	$195,000
Asphalt Pavement/Subbase	$885,000
Surface Water Controls	$60,000
Subtotal	**$1,515,000**
Streambank Enhancement	
Excavation/Remove Wall	$61,000
Slope Cover System	$37,000
Subtotal	**$98,000**
Groundwater Extraction & Monitoring	
Extraction Wells, Pumps, Fittings	$100,000
Conveyance System	$72,000
Electrical	$160,000
Piezometer Installation/Modification	$20,000
Abandon Existing Extraction System & Wells	$25,000
Subtotal	**$377,000**
In-Situ Sludge Treatment	
Mobilization/Demob/Specialist Equipment & Site Preparation	$150,000
Mixing/Air Stripping	$250,000
Cement/Lime	$90,000
Air Treatment	$125,000
Subtotal	**$615,000**
General	
Mobilization/Demobilization	$100,000
Field Engineering/Surveying/E&S Controls	$25,000
Health & Safety Monitoring	$90,000
Bonding	$80,000
Building Demolition	$35,000
Subtotal	**$330,000**
CAPITAL COST TOTAL	**$2,935,000**
CONTINGENCY (30%)	**$880,500**
CONSTRUCTION OVERSIGHT/QA (15%)	**$440,250**
ENGINEERING DESIGN (15%)	**$440,250**
30 YEARS OPERATION & MAINTENANCE (NPV) **(including off-site groundwater treatment and 30% contingency)**	**$2,800,000**
TOTAL NET PRESENT WORTH COST	**$7,496,000**

Notes: 1. Cap costs are based on Asphalt option.
2. Discount rate for present worth calculation 5%.



LEGEND

- EXISTING GROUND CONTOUR
- STREAM
- FENCE
- UTILITY POLE
- MW-4S — GROUNDWATER EXTRACTION WELLS
- MW-8D — EXISTING GROUNDWATER MONITORING WELL
- P-3 — EXISTING PIEZOMETER
- SLURRY WALL ALIGNMENT
- SHEET PILE WALL ALIGNMENT
- LIMIT OF INFILTRATION BARRIER

NOTES

1.) TOPOGRAPHIC DATA AND SURFACE FEATURES BASED ON INFORMATION BY TAYLOR, WISEMAN & TAYLOR CONSULTING ENGINEERS/SURVEYORS/PLANNERS/ LANDSCAPE ARCHITECTS, MOUNT LAUREL, NEW JERSEY, DATED 06/12/92, SCALE 1"=40'.

2.) APPROXIMATE LIMITS OF SLUDGE AREA ARE TAKEN FROM THE FOCUSED FEASABILITY STUDY REPORT (GOLDER, 1997).

100 0 100
scale feet

JOB No.:	943-6222	SCALE:	AS SHOWN
DR BY:	MJS	DATE:	06/30/99
CHK BY:	Som	FILE No.:	NJ06-399
REV BY:	ßf	DR SUBTITLE:	18

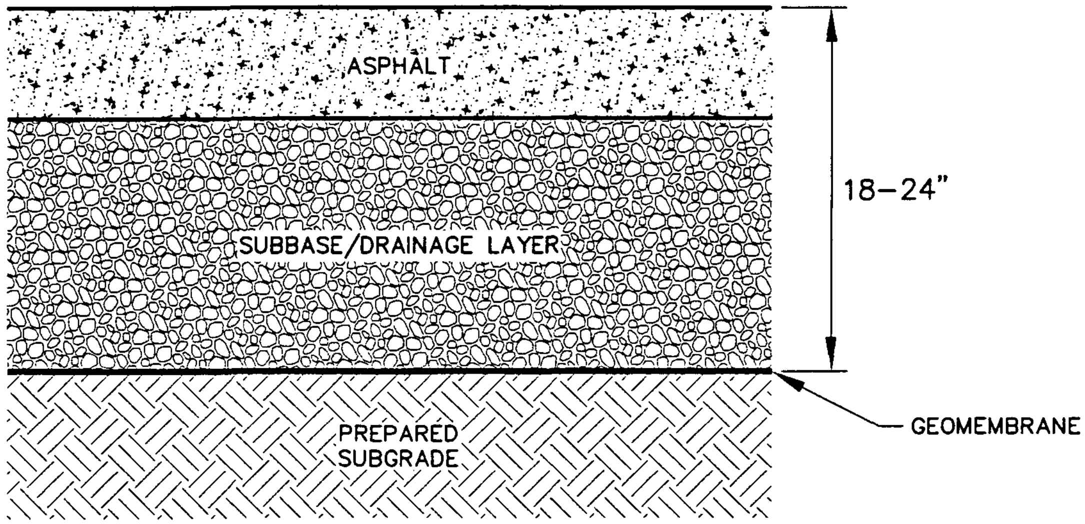
Golder Associates

EXISTING CONDITIONS

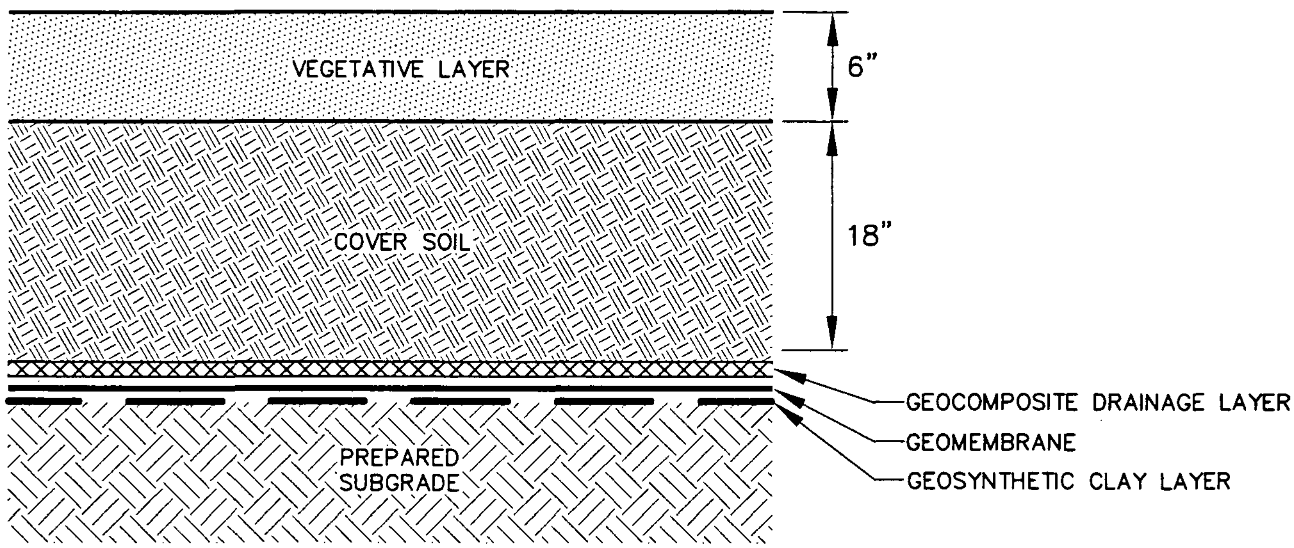
216 PATERSON PLANK ROAD SITE

FIGURE 1

400068



ASPHALT SURFACE OPTION



VEGETATED SURFACE OPTION

400069

NOTE

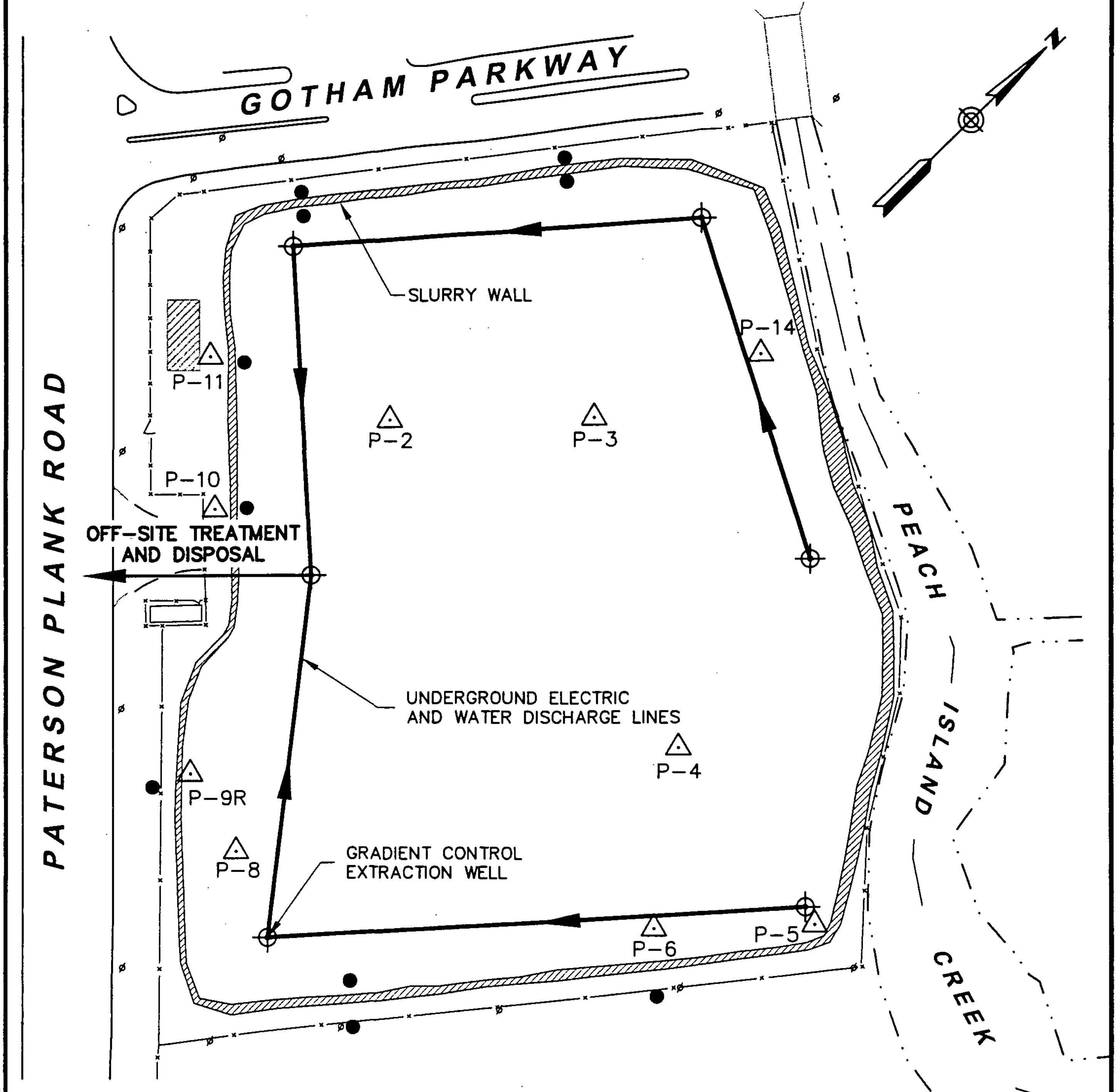
OPTIONS PROVIDE EQUIVALENT PERFORMANCE, AND ACTUAL COVER WILL LIKELY BE A COMBINATION OF OPTIONS TO SUIT SITE RE-USE REQUIREMENTS.

JOB No.:	942–6222	SCALE:	N.T.S.	CAP OPTIONS
CAD BY:	MJS	DATE:	06/30/00	
CHK BY:	SOM	FILE No.:	NJ06–397	
REV BY:	PSL	DR SUBTITLE:	18	

Golder Associates

216 PATERSON PLANK ROAD SITE

FIGURE 2



LEGEND

- PROPOSED EXTRACTION WELL
- PROPOSED PIEZOMETER
- EXISTING PIEZOMETER

NOTE

OFF-SITE TREATMENT AND DISPOSAL PREFERABLY AT POTW (OTHERWISE AT PERMITTED COMMERCIAL FACILITY).

100 0 100
scale feet

400070

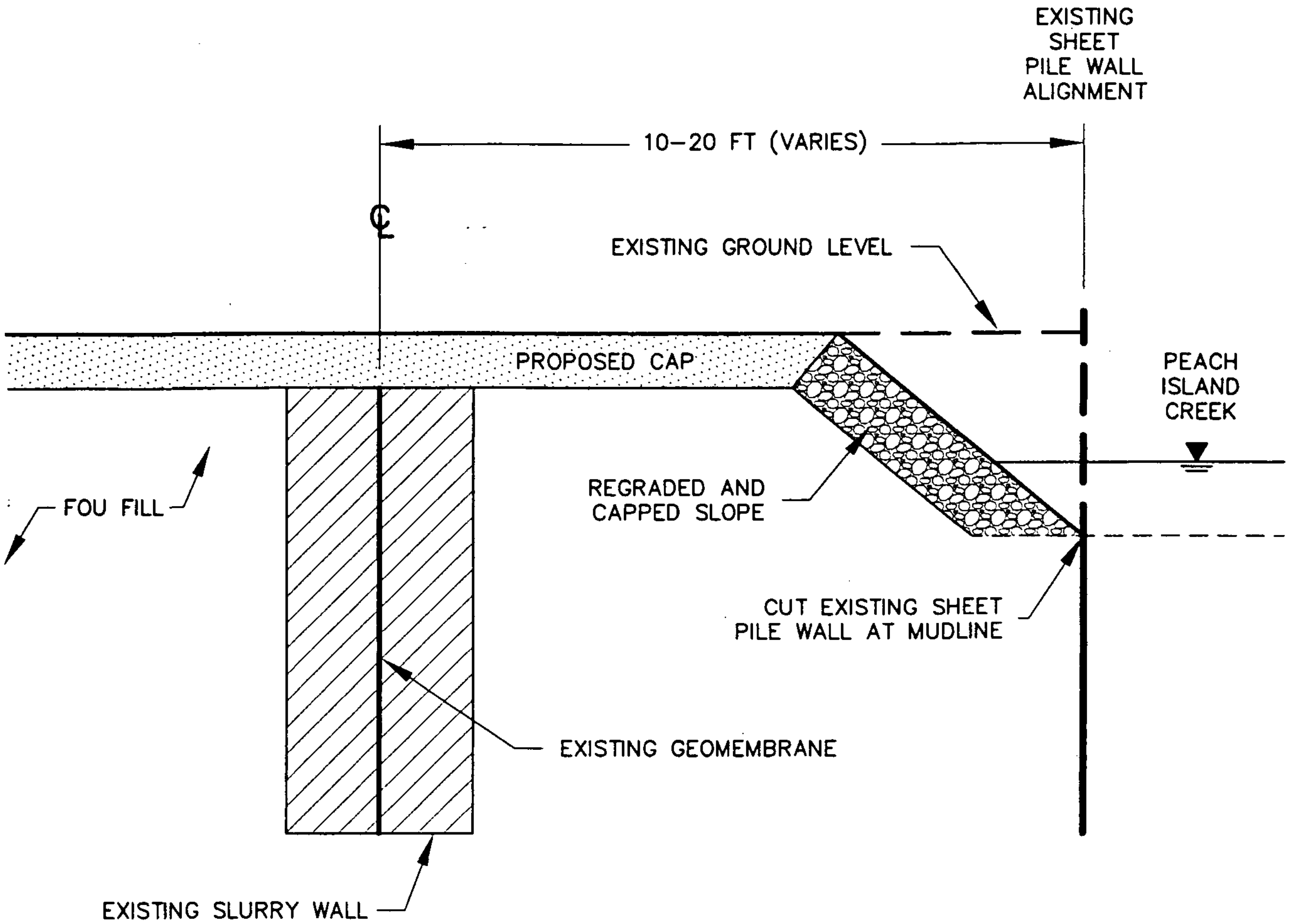
JOB No.:	943-6222	SCALE:	AS SHOWN
CAD BY:	MJS	DATE:	06/30/00
CHK BY:		FILE No.:	NJ06-395
REV BY:		DR SUBTITLE:	18

SHALLOW GROUNDWATER EXTRACTION SYSTEM

Golder Associates

216 PATERSON PLANK ROAD SITE

FIGURE 3



400071

NOTES

1.) PROPOSED ENHANCEMENT REPLACES INTERIM REMEDY SHEET PILE WALL AND INCREASES FLOW CAPACITY OF CREEK CHANNEL.

2.) EXCAVATED SOIL FROM BEHIND EXISTING SHEET PILE WALL SHALL BE PLACED BENEATH COVER ON-SITE.

JOB No.:	943-6222	SCALE:	N.T.S.	STREAM BANK ENHANCEMENT
CAD BY:	MJS	DATE:	06/30/00	
CHK BY:	30m	FILE No.:	NJ06-396	
REV BY:	Bf	DR SUBTITLE:	18	
Golder Associates				216 PATERSON PLANK ROAD SITE — FIGURE 4

APPENDIX A

TREATABILITY STUDY

GOLDER ASSOCIATES, INC.

216 PATERSON PLANK ROAD SITE

TREATABILITY STUDY

FINAL REPORT

PRESENTED TO:

Golder Associates

1951 Old Cuthbert Road, Suite 301
Cherry Hill, New Jersey 08034
(856) 616-8166

PRESENTED BY:

KIBER ENVIRONMENTAL SERVICES

3145 Medlock Bridge Road
Norcross, Georgia 30071
(770) 242-4090

JULY 2000

GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE
TREATABILITY STUDY
FINAL REPORT

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LIST OF APPENDICES

ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
cm/sec	Centimeters per second
^0C	Degrees Celsius
DQOs	Data Quality Objectives
EPA	Environmental Protection Agency
ft	Foot
ft^3	Cubic foot
in	Inch
in^2	Square Inch
L	Liter
lb	Pound
lbs/ft^3	Pounds per cubic foot
lbs/in^2	Pounds per square inch
MDL	Method Detection Limit
mg	Milligram
mg/kg	Milligram per kilogram or ppm
mg/L	Milligram per Liter or ppm
mL	Milliliter
ND	Not Detected
PID	Photoionization Detector
ppb	Parts per billion
ppm	Parts per million
PRPs	Potentially Responsible Parties
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
rpm	Rotations per minute
SVOC	Semivolatile Organic Compounds
TCLP	Toxicity Characteristic Leachate Procedure
UCS	Unconfined Compressive Strength
VOC	Volatile Organic Compounds
ug	Microgram
ug/kg	Microgram per kilogram or ppb
ug/L	Microgram per Liter or ppb

216 PATERSON PLANK ROAD SITE
BENCH-SCALE STABILIZATION
TREATABILITY STUDY
FINAL REPORT

1.0 INTRODUCTION

1.1 TERMS OF REFERENCE

This report is a presentation of the results of the stabilization treatability study conducted for Golder Associates, Inc. (Golder) on materials sampled from the 216 Paterson Plank Road site located in Carlstadt, New Jersey (the site). The treatability study was performed to determine the potential for 1) in-situ air stripping treatment, 2) in-situ stabilization / solidification (s/s) treatment using Portland cement and/or clay, and 3) in-situ s/s treatment using Portland cement and/or clay amended with zero-valent iron. This report was developed to present the testing protocols and results of treatability testing performed by Kiber.

1.2 SCOPE OF WORK

All testing was performed in general accordance with the Scope of Work presented in Golder's Request for Proposal (RFP) dated 23 September 1998 and Kiber's cost proposal dated 15 October 1999.

The treatability study outlined by Kiber, and Golder consisted of Phase I: Baseline Characterization, Phase II: Screening Tests, Phase III: Intermediate Tests and Phase IV: Verification Tests. Specific goals and objectives identified in the Scope of Work include:

- Evaluate the effectiveness of air stripping for reducing volatile organic concentrations prior to the introduction of the various s/s reagents.

- Identify formulations using cement and/or clay based s/s reagents that will provide the desired strength and physical characteristics.

- Evaluate the reduction in total constituent concentration achieved by the selected s/s reagent formulations.

- Evaluate the reduction in constituent mobility provided by the selected s/s reagent formulations

- Evaluate whether zero-valent iron amendments provide additional reduction in total constituent concentrations.

This report was developed to present the results of all testing performed throughout the treatability study.

1.3 REPORT ORGANIZATION

The final report presents the sample tracking information, the test methods and protocols, and the results of analyses and testing conducted throughout the treatability study. Section 2.0 presents information regarding Phase I: Baseline Characterization. This section includes information pertaining to untreated material receipt and handling, sample preparation and analytical and geotechnical evaluations of the untreated material. All information and results associated with Phase II: Screening Tests are presented in Section 3.0. Section 4.0 presents the results of Phase III: Intermediate Tests. The results of Phase IV: Verification Testing are presented in Section 5.0. Section 6.0 presents Kiber's Quality Assurance (QA) and Quality Control (QC) procedures for the treatability study. Following the main text are tables presenting the results of all testing performed. Appendices are presented at the end of the document and include analytical data packages and geotechnical data reports. Note that complete analytical data packages including all raw data and additional summary sheets can be made available upon request.

2.0 PHASE I: BASELINE CHARACTERIZATION

2.1 OVERVIEW

The establishment of the baseline level of constituents is important for comparing and determining the effectiveness of s/s treatment. The analyses also allow Kiber to verify that the samples are representative and consistent with previous samples and materials, and those present at the site. This section presents information on the sampling, handling, preparation and characterization of the untreated material utilized during the treatability study.

2.2 MATERIAL SAMPLING AND RECEIPT

On 4 November 1999, Kiber received a total of ten 2-gallon buckets from the site. Three buckets were labeled GB-06, three buckets were labeled GB-07 and four buckets were labeled GB-06/07. The untreated materials were collected from the 216 Paterson Plank Road site in Carlstadt, New Jersey and forwarded to Kiber by Golder. All site materials were delivered under proper chain of custody (COC) via Federal Express Overnight Delivery. Copies of the COC's are included in Appendix A.

Upon receipt, each 2-gallon bucket of untreated material was logged in and placed into refrigerated storage maintained at a temperature of 4 degrees Celsius (°C). Once the untreated materials cooled to a temperature of 4 °C, Kiber homogenized the untreated material from the site. As instructed by Golder, Kiber composited all materials received from the site to develop a single untreated composite sample. Note that the untreated materials were chilled to 4 °C prior to initiating homogenization to minimize the potential for volatilization of organic compounds. The untreated material was composited by combining the contents of each bucket into a large mixing container. The materials were manually blended together with stainless steel hand tools using low energy mixing techniques in an effort to minimize the volatilization of organic compounds that may be present. Homogenization continued for a period of approximately 10 to 15 minutes until visually homogenous. Upon completion, the homogenized material was placed back into the original shipping containers and returned to refrigerated storage.

In an effort to detect the release of volatile organic compounds from the untreated material during homogenization, Kiber monitored for volatile organic compounds using a Photionization Detector (PID). PID values during homogenization ranged from 40 to 50 parts per million (ppm).

During homogenization, any large and agglomerated particles were broken into smaller, more manageable sizes. All particles and debris larger than 0.5 inches in diameter were removed. This process was performed in order to 1) simulate potential full-scale particle size reduction, and 2) ensure that the material was practical for laboratory analysis. Kiber's experience indicates that contaminants are generally concentrated on the fine-grained particles; therefore, laboratory testing on material of less than 0.5 inches in diameter typically presents a worst-case contaminant scenario. The untreated materials contained a small amount of vegetative debris such as roots and sticks. These materials were removed from the untreated material prior to performing treatability testing. Visual observations of the untreated composite indicated a moist dark brown to black tarry material with a strong organic odor.

2.3 BASELINE CHARACTERIZATION

Untreated material characterization is an essential component of the treatability study. The establishment of the baseline level of constituent concentrations is important for comparing and determining the effectiveness of the treatment processes. The characterization analyses also allow confirmation that the materials were similar to those expected at the site. The untreated composite was characterized through comprehensive analytical and geotechnical characterization analyses.

Baseline characterization analyses were performed in triplicate on the untreated composite material. Specifically, the analytical evaluations performed on the untreated composite included:

Total Volatiles	EPA Method 8260B
SPLP Volatiles	EPA Methods 1312/8260B
Total Pesticides	EPA Method 8081
SPLP Pesticides	EPA Methods 1312/8081
Total PCBs	EPA Method 8081
SPLP PCBs	EPA Methods 1312/8082

Total Arsenic and Lead	EPA Methods 6010B
SPLP Lead and Arsenic	EPA Methods 1312/6010B
Total Chloride	EPA Method 325.2
Material pH	EPA Method 9045C
Ignitability	EPA Method 1010

The following geotechnical characterization tests were conducted on aliquots of each of the untreated materials in accordance with the referenced test method:

Moisture Content	ASTM D 2216
Bulk Unit Weight	ASTM D 5057

The results of baseline characterization analyses are presented in Tables 1 through 5. Tables 1 and 2 present the results of total and SPLP volatile organic analyses. The results of total pesticide and PCB analyses are presented in Table 3. Table 4 presents the results of SPLP pesticide and PCB analyses. The results of all additional analytical and geotechnical testing are included in Table 5. Analytical and geotechnical data reports are included in Appendix B.

Volatile Organic Analyses

Table 1 presents the results of total volatile organic analyses performed on triplicate aliquots of the untreated composite sample. The results indicate that the untreated aliquots contained high concentrations of several volatile organic compounds. Tetrachloroethene, trichloroethene, toluene, o-xylene and m-xylene were found at the highest concentrations. Specifically, tetrachloroethene was detected at a range of 4,900,000 to 7,100,000 micrograms per kilogram (ug/kg), toluene was found at a range of 5,200,000 to 7,500,000 ug/kg, trichloroethene was found at a range of 6,800,000 to 9,500,000 ug/kg, o-xylene was found at a range of 820,000 to 1,200,000 ug/kg and m-xylene was found at a range of 3,100,000 to 4,300,000 ug/kg. Note that the ranges are in reference to the triplicate aliquots of the untreated composite material. Additional compounds detected at concentrations ranging from 740,000 to 1,100,000 ug/kg include ethylbenzene and 1,1,1-trichloroethane. Acetone, chlorobenzene, chloroform, 1,2-dichlorobenzene, 1,1-dichloroethane, 4-methyl-2-pentanone, methylene chloride, n-propyl benzene, 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene were all detected at concentrations ranging from 78,000 to 320,000 ug/kg. Other compounds detected at concentrations of less than 100,000 ug/kg include benzene, 1,2-dichloroethane, cis-1,2-dichloroethene, 1,2-dichloropropane, isopropylbenzene, and naphthalene.

SPLP Volatile Organic Analyses

The results of SPLP volatile organic analyses are presented in Table 2. The untreated composite material exhibited leachable tetrachloroethene concentrations ranging from 14,000 to 16,000 micrograms per liter (ug/L), leachable toluene concentrations ranging from 49,000 to 50,000 ug/L, leachable 1,1,1-trichloroethane concentrations ranging from 13,000 to 14,000 ug/L, leachable trichloroethene concentrations ranging from 84,000 to 89,000 ug/L, and leachable m-xylene concentrations ranging from 10,000 to 11,000 ug/L. Acetone was found at concentrations ranging from 12,000 to 13,000 ug/L, 2-butanone was detected at concentrations ranging from 9,300 to 10,000 ug/L, and 4-methyl-2-pentanone was detected at concentrations ranging from 11,000 to 12,000 ug/L. Compounds detected at concentrations ranging from 880 ug/L to 5,000 ug/L include chlorobenzene, chloroform, 1,1-dichloroethane, 1,2-dichloroethane, cis-1,2-dichloroethene, methylene chloride and o-xylene. Additional volatile organic compounds detected at concentrations of less than 1,000 ug/L include benzene, 1,2-dichlorobenzene, 1,1-dichloroethene, 1,2-dichloropropane, isopropylbenzene, naphthalene, n-propyl benzene, 1,1,2-trichloroethane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene and vinyl chloride.

Total Pesticide and PCB Analyses

Table 3 presents the results of total pesticide and PCB analyses performed on the untreated composite material. A review of the results of aliquots A, B and C indicate that Dieldren was the only pesticide detected in each of the three aliquots. Specifically, Dieldrin was detected in aliquot A at a concentration of 4,700 ug/kg, in aliquot B at a concentration of 9,600 ug/kg and in aliquot C at a concentration of 13,000 ug/kg. All remaining pesticide compounds were not detected in the samples. A review of the total PCB data indicates that Aroclor-1242 was the only PCB compound detected in the untreated composite aliquots. Aroclor-1242 concentrations ranged from 330,000 to 990,000 ug/kg in the untreated composite triplicate analyses.

SPLP Pesticide and PCB Analyses

The results of SPLP pesticide and PCB analyses are presented in Table 4. As seen previously with the total pesticide analyses, Dieldrin was the only pesticide compound found at detectable concentrations. Specifically, Dieldrin was found at leachable concentrations of 60 ug/L, 43 mg/L and 45 mg/L, in aliquots A, B and C, respectively. The SPLP PCB data indicates that Aroclor-1242 was the only aroclor compound detected in the SPLP leachate. Aroclor-1242 was found in aliquots A, B and C at leachable concentrations of 5,000 ug/L, 3,300 ug/L and 4,400 ug/L, respectively.

Additional Chemical and Physical Analyses

Table 5 presents the results of all additional chemical and physical analyses performed on the untreated composite sample. Based on review of the table, total lead was detected at concentrations ranging from 770 to 1,200 milligrams per kilogram (mg/kg), while SPLP lead concentrations ranged from 2.6 to 3.6 milligrams per liter (mg/L). Total arsenic concentrations ranged from 13 to 18 mg/kg, and SPLP arsenic was not detected in the samples. Chloride was found in the untreated composite material at concentrations ranging from 1,200 to 5,700 mg/kg. The untreated composite sample had material pH values ranging from 8.9 to 9.2 standard units (s.u.), flash points ranging from 35 to 39 °C, dry-basis moisture contents ranging from 58 to 62%, a bulk density of 95 pounds per cubic feet (lbs/ft^3) and a bulk specific gravity of 1.5. Once baseline characterization of the untreated composite material was complete, Kiber proceeded with Phase II: Screening Tests.

3.0 SCREENING TESTS

3.1 OVERVIEW

The screening phase of the 216 Paterson Plank Road site treatability study was designed to evaluate a variety of reagent designs capable of stabilizing and solidifying the untreated composite material. Prior to developing mixtures, Kiber provided Golder with a proposed mixture development table for review. After review by Golder, Kiber proceeded with Phase II mixture development. Note that mixtures were developed with the addition of pumpable reagent slurries to simulate full-scale in-situ s/s treatment as specified in the Statement of Work. The following sections summarize the protocols used by Kiber and the results of all testing and observations performed during Phase II.

3.2 BLENDING TECHNIQUES AND SAMPLE FORMATION

A total of 12 mixtures were developed during Phase II: Screening Tests. Reagents that were utilized for treatment include Type I Portland cement alone, a combination of cement and organophillic clay, and a combination of cement and hydrated lime.

Each mixture was developed by placing an aliquot of the untreated composite into a blending chamber. The specified percentage of reagent was slurried with the specified percentage of water and added to the untreated material. For mixtures developed with more than one reagent, the reagents were blended dry, slurried with water and added to the untreated composite and blended. The mixture was then blended at a rate of approximately 40 to 60 rotations per minute (rpm) until visually homogenous, a period of 60 to 90 seconds.

For all mixtures, the percent reagent and percent water are based on the initial weight of the untreated aliquot. For example, in a mixture with a 10% addition of cement and 8% addition of water, 20 grams of cement was slurried with 16 grams of water and added to 200 grams of untreated material. Potable tap water was used for all the mixtures since distilled or deionized water is not practical for use in full-scale remediation.

After mixing was complete, the treated materials were transferred to cylindrical molds and allowed to cure for 21 days in a humid environment maintained at a temperature between 18 and 24°C. Treated materials were cured in a humid environment in an effort to represent conditions that will be present during full-scale treatment. Table 6 presents the mixtures developed by Kiber. This table includes Kiber's mixture numbers, reagent type, and reagent and water addition rates.

During the curing process the treated materials were evaluated for setting and strength properties with a pocket penetrometer. Penetrometer analyses are performed with a Brainard-Kilman S-170 pocket penetrometer. The pocket penetrometer is a hand held instrument commonly used during field drilling tests to estimate the unconfined compressive strength of soils. The penetrometer is calibrated by the manufacturer in increments of 0.25 tons per square foot (tons/ft^2) with a maximum reading of 4.5 tons/ft^2 (63 lbs/in^2).

3.3 TREATED EVALUATIONS

The results of penetrometer analyses performed on the treated materials, as presented in Table 6, indicate that the mixtures treated with the highest concentrations of cement alone resulted in the highest penetrometer strength values. Specifically, the addition of Type I Portland cement at addition rates of 40 and 50% resulted in penetrometer strength values of 2.0 and 2.5 tons/ft^2, respectively after 21 days of curing. The mixtures treated with 10% Type I Portland cement, and a combination of 20% Type I Portland cement and 3% organophillic clay resulted in penetrometer strengths of 1.5 tons/ft^2 after 21 days of curing. All remaining mixtures exhibited penetrometer strengths of 1.0 tons/ft^2 or less after 21 days of curing.

Based on the results of penetrometer strength testing data, Kiber and Golder selected treated materials for performing unconfined compressive strength testing, after 21 days of curing. Specifically, Kiber and Golder selected a total of eight treatment designs for unconfined compressive strength testing. The treatment designs were selected based on visual observations, penetrometer strengths, cost-effectiveness and Kiber's experience in treating similar materials. The UCS test is a measure of the shear strength of a soil-like material under unsaturated and unconfined conditions. All testing was performed on specimens measuring 2.0 inches in diameter and 4.0 inches in length. Before testing, the weight and dimensions were recorded for each test specimen. Each specimen was tested at a strain rate of 1 percent per minute. Testing was terminated at failure of the specimen as defined by ASTM D 2166. To clarify, UCS testing was terminated after achieving the maximum unconfined compressive strength or upon attaining 15% strain, whichever occurred first. The treated materials selected for testing are included in Table 7. A review of the results indicates that the mixture that exhibited the highest unconfined compressive strength includes the mixture developed with a combination of 20% cement and 20% hydrated lime. This mixture design achieved a strength of 15 lbs/in^2 after 21 days of curing. The mixtures developed with 10% Type I Portland cement, 50% Type I Portland cement, and a combination of 20% cement and 3% clay all resulted in unconfined compressive strength values of 14 lbs/in^2. Physical data reports are included in Appendix C.

Note that the treated materials were developed in an effort to improve the strength and handling characteristics of the untreated composite material. Although a specific unconfined compressive strength criteria was not identified, Kiber developed treated materials in an effort to achieve a strength of approximately 10 to 15 lbs/in^2. Based on the results of unconfined compressive strength testing, Kiber and Golder identified mixture designs to be evaluated and/or optimized during the next phase of testing.

4.0 PHASE III: INTERMEDIATE TESTS

4.1 OVERVIEW

The Intermediate Testing phase of the 216 Paterson Plank Road site treatability study was performed to 1) evaluate the use of air stripping as a method for pretreatment of the site material, 2) further evaluate and optimize treatment designs evaluated during Phase II, and 3) evaluate the potential benefit of zero-valent iron amendment. Based on the results of Phase II: Screening Tests, Kiber and Golder identified candidate mixtures based on unconfined compressive strength testing results, cost effectiveness and visual observations. During this phase of testing, Kiber evaluated the benefit of iron amendment pretreatment in addition to the candidate mixtures. Specifically, Kiber and Golder identified a total of four mixture designs to be evaluated with and without iron pretreatment for Phase III of the treatability study. The mixtures designs that were selected include the following:

10% Type I Portland Cement
20% Type I Portland Cement / 3% Organophillic Clay
20% Type I Portland Cement / 5% Organophillic Clay
10% Type I Portland Cement / 10% Hydrated Lime

These mixture designs were evaluated following air stripping evaluations. The following sections include detailed discussions of the procedures utilized and the results of all testing performed during Phase III of the treatability study.

4.2 AIR STRIPPING EVALUATIONS

Air stripping evaluations were performed by Kiber to identify the potential benefit of air stripping in reducing the concentration of total volatile organic compounds prior to s/s treatment. Since the presence of high organic concentrations commonly interferes with the cement hydration reaction, air stripping the untreated composite prior to s/s treatment has been proven to reduce the level of matrix interference by effecting mass removal of volatile organic compounds thus allowing a shorter and more intense cement hydration reaction. Under high organic conditions, cement hydration reactions are generally less effective and slower to occur. Kiber performed air stripping treatment in a glove bag to assist in quantifying the volatile organic compounds expelled during air stripping treatment.

4.2.1 Glove bag and Air Stripping Setup and Performance

Air stripping treatment was performed inside of a glove bag, which is a sealed, air-tight chamber. Once all necessary equipment is placed into the glove bag, it is sealed from the outside environment. Necessary equipment includes all materials needed to perform air stripping treatment as well as monitoring equipment. After the glove bag was sealed, the PID meter was turned on and used for real-time evaluation of the conditions inside the glove bag chamber. Monitoring of organic emissions was performed throughout air stripping treatment.

Testing was performed by connecting one end of the glove bag chamber to a breathing-quality air supply. The air supply was then used to purge the chamber air prior to initiation of the air stripping procedure. Air was continuously flushed from the sealed glove bag until constituent levels inside the glove bag, as measured by the PID meter, were reduced to levels lower than laboratory background. The glove bag was purged for a period of 15 to 20 minutes prior to initiation of air stripping treatment.

After purging the chamber, the other end of the glove bag was connected to a series of three carbon cartridges and an air pump running at 3 liters per minute (lpm). The carbon cartridges utilized during the volatilization study were 6 millimeters (mm) in diameter and 70 mm in length, 150 milligram (mg) coconut based charcoal cartridges. In order to reduce the likelihood of laboratory contamination entering the glove bag, and therefore being trapped on the carbon cartridges, the inflow to the glove bag was kept higher than the outflow. As such, a slight positive pressure was maintained within the glove bag based on a breathing air inflow rate of 3 lpm, an air stripping inflow rate of 5 lpm and an outflow rate of 3 lpm. The air supply was used to flush any volatile organic compounds from the chamber and onto the carbon cartridges. Once the carbon cartridges were attached to the pumps, air stripping treatment began in accordance with the following protocols.

Air stripping was performed using a bench-scale Hobart style mixer modified with air injection ports. Treatment was performed by placing a 1,500 gram aliquot of untreated composite material into the air-port injection chamber. The material was then blended at a rate of approximately 60 to 90 rpm while air was injected at a rate of 5 lpm through the material to promote volatilization of constituents. These revolution rates are typical to those used during full-scale treatment. Air injection treatment was performed for a total of 120 minutes. Air was supplied by a compressor that supplies breathing-quality air.

The carbon cartridges were attached to the glove bag as soon as air stripping treatment was initiated. PID readings were recorded approximately every minute for the first 20 minutes and approximately every 5 to 10 minutes thereafter for 120 minutes. Upon reaching 120 minutes, Kiber removed the carbon cartridges and submitted them for total volatile organic analyses in accordance with EPA method 8260B.

A graph presenting PID and values over time is presented in Table 8. Also presented in Table 8 is Kiber's mixture number, material type, glove bag setup information and maximum PID value recorded during air stripping treatment. A review of the graph presenting PID values recorded during air stripping indicate that the highest PID values were observed during the first 10 minutes of air stripping. A maximum PID value of 1,566 ppm was observed after 3 minutes of air stripping. PID values continued to drop throughout the next 120 minutes. Note that there was a slight increase in PID values from 29 through 60 minutes. After reaching 60 minutes of air stripping, PID values continued to diminish to a final PID value of 69 ppm after 120 minutes of air stripping.

4.2.2 Glove bag and Air Stripping Treated Evaluations

During air stripping treatment aliquots of the air stripped material were removed from the injection chamber at intervals of 10 minutes, 30 minutes, 60 minutes and 120 minutes. Note that a sample of the untreated composite aliquot was also sampled at time zero for a baseline concentration. Each aliquot was subjected to total volatile organic analyses in accordance with EPA Method 8260B. The carbon cartridges that were connected to the glove bag during air stripping treatment were also subjected to total volatile organic analyses after 120 minutes of air stripping. The results of air stripping evaluations are included in Tables 9 and 10. Analytical data reports are included in Appendix D.

The results of total volatile organic analyses performed on the air stripped soil, as presented in Table 9, indicate significant reductions in total volatile organic concentrations as a result of air stripping treatment. Specifically, trichloroethene which was present in the time zero sample at 8,000,000 ug/kg, was reduced to 260,000 ug/kg after 120 minutes of air stripping. Tetrachloroethane and toluene were reduced from 5,800,000 and 5,900,000 ug/kg to 610,000 and 370,000 ug/kg, respectively after air stripping treatment. m-Xylene was reduced from an initial concentration of 3,000,000 ug/kg to 620,000 ug/kg, and o-xylene was reduced from 800,000 ug/kg to 190,000 ug/kg. In summary, air stripping treatment was capable of reducing the concentrations of all detected compounds after 120 minutes of air stripping treatment.

Table 10 presents the results of total volatile organic analyses performed on the carbon cartridges. In order to identify the location of the carbon cartridges in series, each cartridge was designated a letter label. Carbon A represents the carbon closest to the outside air, or furthest away from the glove bag. Carbon C is the carbon closest to the glove bag, or furthest from the outside air. The results of total volatile organic analyses performed on the carbon cartridges indicate very high concentrations of organic compounds. Additionally, as expected, Carbon C (carbon closest to the glove bag) exhibited the highest volatile organic concentrations followed by Carbon B and Carbon A.

A review of the results indicates that tetrachloroethene was detected at a concentration of 40,000,000 ug/kg in Carbon C, 29,000,000 ug/kg in Carbon B and 27,000,000 ug/kg in Carbon A. Toluene concentrations for Carbons A, B and C were 18,000,000 ug/kg, 19,000,000 ug/kg and 27,000,000 ug/kg, respectively, and m-xylene concentrations were found at concentrations of 39,000,000 ug/kg, 43,000,000 ug/kg and 65,000,000 ug/kg, respectively. Carbon A, B and C resulted in o-xylene concentrations of 13,000,000 ug/kg, 15,000,000 ug/kg and 21,000,000 ug/kg, respectively, and 1,2,4-trimethylbenzene concentrations of 6,300,000 ug/kg, 8,400,000 ug/kg and 2,800,000 ug/kg, respectively. Ethylbenzene was detected in Carbon A at a concentration of 7,300,000 ug/kg, in Carbon B at a concentration of 7,300,000 ug/kg and in Carbon C at a concentration of 12,000,000 ug/kg. 1,3,5-Trimethylbenzene, 4-methyl-2-pentanone and n-propyl benzene were found at concentrations ranging from 1,500,000 ug/kg to 3,300,000 in each of the carbon cartridges. Other compounds detected in the carbon cartridges include 1,1,1-trichloroethane, p-isopropyltoluene, isopropyl benzene, s-butyl benzene, chlorobenzene and 1,2-dichlorobenzene.

4.3 ZERO-VALENT IRON AMENDMENT

Upon completion of glove bag evaluations, Kiber and Golder identified additional mixture designs to be evaluated. Mixture designs were selected based on performance during previous phases of testing and cost effectiveness. Mixture designs were evaluated with and without zero-valent iron addition to identify the effectiveness of iron in reducing organic contaminant concentrations. Note that prior to performing mixture development, the untreated composite was reanalyzed to identify the concentrations of organic compounds present. The untreated composite material evaluated during this phase of testing was identified as "parent material". The following sections included detailed discussions of the procedures followed for analysis of the parent material and mixture development.

4.3.1 Parent Material Characterization

During this phase of testing, Kiber and Golder identified a total of four mixture designs to be evaluated with and without zero-valent iron addition, for a total of eight mixtures. Prior to performing mixture development, and as previously mentioned, Kiber sampled an aliquot of parent material in a sufficient quantity to complete the eight outlined mixtures. Once the parent material had been sampled, Kiber split the sample into four aliquots. Each of the four aliquots of parent material represented the material to be used for each of the four treatment designs with and without zero-valent iron. The parent materials and the mixtures that they represent are as follows:

Parent Material A	Mixtures 013 and 017
Parent Material B	Mixtures 014 and 018
Parent Material C	Mixtures 015 and 019
Parent Material D	Mixtures 016 and 020

The two mixtures identified for each of the four parent material aliquots includes the same treatment design with and without iron addition. Four parent materials were segregated in this manner to identify the concentrations of contaminants present for each individual treatment design, and to minimize the potential impact of the heterogeneity of the parent material.

Once the parent material had been separated into four aliquots, Kiber subjected each of the four aliquots to analytical characterization analyses. The characterization analyses performed on each of the four aliquots are as follows:

Total Volatiles	EPA Method 8260B
SPLP Volatiles	EPA Methods 1312/8260B
Total PCBs	EPA Method 8081
SPLP PCBs	EPA Methods 1312/8082
Total Chloride	EPA Method 325.2

The results of parent material characterization analyses are included in Tables 11 through 14. Tables 11 and 12 include the results of total and SPLP volatile organic analyses, while Tables 13 and 14 include the results of total and SPLP PCB analyses. Total chloride results are also included on Table 13. Analytical data reports are included in Appendix D.

<u>Volatile Organic Analyses</u>

The results of total volatile organic analyses, as presented in Table 11, indicate that Parent Materials B, C and D exhibited similar volatile organic concentrations. Parent Material A generally exhibited slightly lower concentrations of the volatile organic compounds previously detected at the highest concentrations in the untreated composite. The compounds found at the highest concentrations in the parent materials include tetrachloroethene, toluene, trichloroethene and m-xylene. These compounds were detected in Parent Materials B, C and D at concentrations ranging from 1,300,000 to 1,600,000 ug/kg, 1,300,000 to 1,800,000 ug/kg and 870,000 to 1,200,000 ug/kg, respectively. Tetrachloroethene, toluene and m-xylene were detected in Parent material A at concentrations of 700,000 ug/kg, 750,000 ug/kg and 500,000 ug/kg, respectively. 1,1,1-Trichloroethane was found at concentrations ranging from 130,000 to 310,000 ug/kg, and ethylbenzene was found at concentrations ranging from 210,000 to 280,000 ug/kg in the parent materials. o-Xylene was detected in the parent materials at concentrations ranging from 220,000 to 320,000 ug/kg, while 1,2,4-trimethylbenzene was detected at concentrations ranging from 99,000 to 130,000 ug/kg. Several other compounds were detected in the parent materials at concentrations of less than 200,000 ug/kg.

<u>SPLP Volatile Organic Analyses</u>

Table 12 presents the results of SPLP volatile organic analyses performed on the parent materials. The results indicate that as seen previously, tetrachloroethene, toluene, trichloroethene and m-xylene were found at the highest concentrations. Specifically, tetrachloroethene was found at concentrations ranging from 11,000 to 13,000 ug/L, toluene was found at concentrations ranging from 41,000 to 48,000 ug/L, trichloroethene was found at concentrations ranging from 62,000 to 78,000 ug/L and m-xylene was found at concentrations ranging from 9,000 to 9,800 ug/L. 4-Methyl-2-pentanone was found at concentrations ranging from 5,200 to 7,100 ug/L, and acetone was found at concentrations ranging from 4,200 to 5,900 ug/L. Volatile organic compounds found at leachable concentrations ranging from 1,400 to 3,900 ug/L include 2-butanone, chlorobenzene, chloroform, 1,1-dichloroethane, 1,2-dichloroethane, ethylbenzene, methylene chloride and o-xylene. Additional volatile organic compounds found at SPLP concentrations of less than 910 ug/L include benzene, 1,2-dichlorobenzene, 1,1-dichloroethene, cis-1,2-dichloroethene, 1,2-dichloropropane, isopropyl benzene, naphthalene, n-propyl benzene, 1,1,2-trichloroethane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene and vinyl chloride. All remaining volatile organic compounds were not detected in the samples.

Total PCBs and Chloride

The results of total PCB and chloride analyses are presented in Table 13. A review of the results indicates that Aroclor-1242 was the only compound detected in each of the four parent materials. Aroclor-1242 was detected in Parent Material A at a concentration of 430,000 ug/kg, in Parent Material B at a concentration of 410,000 ug/kg, in Parent Material C at a concentration of 500,000 ug/kg and in Parent Material D at a concentration of 340,000 ug/kg. Chloride was found in the parent materials at concentrations ranging from 14,000 to 40,000 ug/kg. Parent Material A had a chloride concentration of 40,000 mg/kg, Parent Material B had a chloride concentration of 25,000 mg/kg, Parent Material C had a chloride concentration of 29,000 mg/kg and Parent Material D had a chloride concentration of 14,000 mg/kg.

SPLP PCBs

The results of SPLP PCB analyses, as presented in Table 14, indicate that Aroclor-1242 was the only compound found at detectable concentrations. Parent Material B had the highest Aroclor-1242 concentration of 190 ug/L, while Parent Material A had the lowest Aroclor-1242 concentration of 98 ug/L. Parent Materials C and D had Aroclor-1242 concentrations of 100 and 140 ug/L, respectively.

Review of the results of parent material characterization indicates that the volatile organic and PCB concentrations are lower than those observed during Phase I: Baseline characterization. The apparent decrease in contaminant concentrations is most likely attributed to sample variability. Although Kiber performed homogenization of the original untreated composite material, it is nearly impossible to obtain a sample where variability does not exist. This is especially true when materials that are being testing contain very high concentrations of contaminants and the material has an agglomerated consistency.

4.3.2 Zero-Valent Iron Amendment

Once Kiber had removed samples from each of the four parent materials for analytical characterization testing, Kiber proceeded with Zero-valent iron amendment mixture development on the untreated materials. As previously mentioned, Kiber developed a total of four mixtures with and without iron addition for a total of eight mixtures during this phase of testing. Mixtures were selected for this round of treatment based on treatment and cost effectiveness during previous phases of the study. The mixture designs that were evaluated are as follows:

10% Type I Portland Cement
20% Type I Portland Cement / 3% Organophillic Clay
20% Type I Portland Cement / 5% Organophillic Clay
10% Type I Portland Cement / 10% Hydrated Lime

Note that these four mixture designs were evaluated without iron addition (Mixtures 013 through 016) and with iron addition (Mixtures 017 through 020). The mixtures developed by Kiber are presented in Table 15. This table presents Kiber's sample number, material type, reagent type, and reagent and water addition rates.

Mixture development was performed by placing a pre-weighed aliquot of the specified parent material into a blending chamber. At this time, for the iron amended mixtures, iron was added at a 10.5% addition rate by weight and mixed until homogenous, a time of approximately 60 to 90 seconds. For the mixtures that did not receive iron amendment, the parent material for these mixtures was still mixed in a similar manner to those that did receive iron addition. This was performed to ensure that any volatilization that occurred solely due to mixing was duplicated in both treatment designs. Otherwise a reduction in volatile organic compounds in the materials that received iron amendment, may be due to either iron amendment or mixing. Once the iron had been added and all the materials blended, the mixtures were allowed to cure for a period of 3 days, at which time each was subjected to s/s treatment.

Stabilization mixtures were developed in direct accordance with the mixtures developed during Phase II. After mixture development, the treated materials were compacted into cylindrical molds and allowed to cure for a period of 21 days in a humid environment. Upon reaching 21 days of curing, each was subjected to treated evaluations.

4.3.3 Treated Evaluations

Upon reaching 21 days of curing, each of the eight treated materials were sampled and subjected to treated evaluations. Specifically, the treated materials were subjected to the following treated evaluations in accordance with the referenced test methods:

Total Volatiles	EPA Method 8260B
SPLP Volatiles	EPA Methods 1312/8260B
Total PCBs	EPA Method 8081
SPLP PCBs	EPA Methods 1312/8082
Total Chloride	EPA Method 325.2
Unconfined Compressive Strength	ASTM D 2166

The results of all analytical and physical analyses are presented in Tables 16 through 20. Tables 16 and 17 include the results of total and SPLP volatile organic analyses, and Tables 18 and 19 include the results of total and SPLP PCB analyses. Total chloride results are also presented on Table 18. The results of unconfined compressive strength testing are included in Table 20. Data reports are presented in Appendix D.

<u>Volatile Organic Analyses</u>

The results of volatile organic analyses as presented in Table 16 indicate that all treated materials resulted in relatively similar volatile organic concentrations. Slightly lower total volatile organic concentrations are indicated for the mixtures developed with iron amendment. Note, however, that the slight apparent reduction is most likely due to dilution since both mixture types were mixed in a similar manner to account for volatilization that may occur as a result of just mixing. Tetrachloroethene concentrations ranged from 1,400,000 ug/kg to 2,200,000 ug/kg, and toluene concentrations ranged from 1,100,000 to 1,800,000 ug/kg. Trichloroethene was detected at concentrations ranging from 790,000 to 1,900,000 ug/kg, and m-xylene concentrations ranged from 1,100,000 to 1,600,000 ug/kg. Ethylbenzene and o-xylene were found at concentrations ranging from 240,000 to 350,000 ug/kg. Compounds detected at concentrations ranging from 27,000 to 220,000 ug/kg include chlorobenzene, 1,2-dichlorobenzene, 4-methyl-2-pentanone, naphthalene, n-propyl benzene, 1,1,1-trichloroethane, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene. Other compounds detected in the treated materials at concentrations of less than 20,000 ug/kg include p-isopropyltoluene, isopropyl benzene, 1,2-

dichloropropane, cis-1,2-dichloroethene, 1,1-dichloroethene, 1,2-dichloroethane, 1,1-dichloroethane, 1,4-dichlorobenzene, chloroform, s-butylbenzene, n-butylbenzene, 2-butanone, benzene and acetone. All remaining compounds were not detected in the samples.

SPLP Volatile Organic Analyses

Table 17 presents the results of SPLP volatile organic analyses performed on the Phase III treated materials. A review of the results indicates that tetrachloroethene was detected at concentrations ranging from 7,800 to 11,000 ug/L, toluene was found at concentrations ranging from 14,000 to 29,000 ug/L, trichloroethene was found at concentrations ranging from 11,000 to 35,000 ug/L and m-xylene was found at concentrations ranging from 7,900 to 9,000 ug/L. Ethylbenzene, o-xylene, 1,1,1-trichloroethane, 4-methyl-2-pentanone were found at concentrations ranging from 800 to 4,000 ug/L. Several other volatile organic compounds were found at leachable concentrations of less than 1,000 ug/L.

Total PCB and Chloride Analyses

The results of total PCB and chloride analyses are presented in Table 18. The only aroclor detected in each of the treated materials includes Aroclor-1242. Aroclor-1242 was found at concentrations ranging from as low as 350,000 ug/kg to as high as 560,000 ug/kg. Chloride was detected in each of the eight treated materials at concentrations ranging from 3,400 to 7,100 mg/kg.

SPLP PCB Analyses

The results of SPLP PCB analyses, as presented in Table 19, indicate that Aroclor-1242 concentrations ranged from 0.97 to 19 ug/L. All remaining aroclors were not detected in the samples. Note that as seen with previous analyses on the treated materials, the mixture developed with iron amendment resulted in generally lower leachable PCB concentrations. Although a potential correlation, Kiber believes that the reduction is most likely due to dilution through iron addition.

Unconfined Compressive Strength Testing

The results of unconfined compressive strength testing are included in Table 20. A review of the results indicates that all materials achieved strengths of at least 23 lbs/in^2 after 21 days of curing. The treated materials subjected to iron amendment resulted in slightly higher strengths than those that did not receive iron addition. However, the difference in strength values may also be associated with other variables such as 1) material heterogeneity and 2) water addition or moisture content. The mixture that achieved the highest strength (49%) included the mixture developed with a combination of 20% cement and 3% organophillic clay. All remaining treated materials exhibited strengths ranging from 27 lbs/in^2 to 39 lbs/in^2.

The results of analytical and physical evaluation of the treated materials from Phase III indicate that all mixture designs are capable of reducing the concentrations of leachable volatile organic compounds and PCBs. Additionally, all mixture designs were capable of producing sufficient strength in the final treated materials after 21 days of curing. Although iron amendment resulted in apparent decreases in both volatile organic and PCB concentrations, Kiber believes that the reductions are due primarily to dilution rather than treatment. Based on the analytical and physical results of the treated materials, Kiber and Golder selected two mixture designs with and without iron addition for further evaluation during Phase IV of the treatability study.

5.0 VERIFICATION TESTING

5.1 INTRODUCTION

Verification testing was designed to evaluate the optimum mixtures identified during Phase III of the treatability study after air stripping pretreatment. This phase of testing was performed in a similar manner to Phase III. Initially, Kiber sampled a large aliquot of parent material in a sufficient quantity to perform all mixture development. The parent materials were analyzed to develop a baseline concentration for the untreated materials to be utilized for mixture development. Once the samples were removed for baseline characterization analyses, the material was air stripped. Air stripping was followed by iron amendment and three days of curing. Upon reaching three days of curing the treated materials were again sampled and subjected to analytical characterization testing. Once the aliquots were removed, Kiber proceeded with stabilization treatment of each of the four aliquots. Upon reaching the target cure date, the treated materials were subjected to comprehensive analytical and physical characterization testing. The treatment designs that were evaluated throughout Phase IV with and without iron addition are as follows:

10% Type I Portland Cement
10% Type I Portland Cement / 10% Lime

The following sections include a discussion of the results of parent material characterization analyses followed by treatment and treated material characterization. These sections also include detailed descriptions of the protocols followed for all testing performed during Phase IV.

5.2 PARENT MATERIAL CHARACTERIZATION

Parent material characterization was performed in accordance with the protocols followed during Phase III. Kiber sampled a large aliquot of untreated composite material for mixture development during Phase IV. Note that for Phase IV testing, Kiber opened a bucket that had been sealed since the beginning of the treatability study in the event that the previously opened buckets had been subject to volatilization. Once the aliquot was removed, Kiber proceeded to slightly homogenize the sample to ensure a homogenous material for testing. After homogenization, Kiber separated the aliquot into two separate aliquots and labeled them as Parent Material A and Parent Material B. Each of the two parent materials would be used to develop a total of two mixtures. The mixtures developed with the specified parent materials are as follows:

Parent Material A	Mixtures 021 and 023
Parent Material B	Mixtures 022 and 024

Note that the mixtures developed with each parent material represent the same treatment design, however, one mixture includes iron amendment and the other does not. Once the parent materials were designated, Kiber proceeded to sample each aliquot for parent material characterization analyses. Each of the parent materials was sampled and subjected to the following analytical analyses in accordance with the referenced test methods:

Total Volatiles	EPA Method 8260B
SPLP Volatiles	EPA Methods 1312/8260B
Total Pesticides	EPA Method 8081
SPLP Pesticides	EPA Methods 1312/8081
Total PCBs	EPA Method 8081
SPLP PCBs	EPA Methods 1312/8082
Total TAL Metals	EPA Methods 6010B/7471
SPLP TAL Metals	EPA Methods 1312/6010B/7470
Total Chloride	EPA Method 325.2

The results of parent material characterization analyses are presented in Tables 21 through 26. Total and SPLP volatile organic analyses are presented in Tables 21 and 22, and total and SPLP pesticide and PCB analyses are presented in Tables 23 and 24. The results of total and SPLP TAL metals analyses are presented in Tables 25 and 26, and total chloride results are presented in Table 25. Analytical data reports are included in Appendix E.

Total Volatile Organic Analyses

Table 21 presents the results of total volatiles organic analyses performed on the Phase IV parent materials. The results indicate that the parent materials had very similar concentrations to those observed during Phase I: Baseline Characterization. Specifically, tetrachloroethene was detected at concentrations of 5,200,000 ug/kg and 6,300,000 ug/kg, while toluene was detected at concentrations of 5,200,000 ug/kg and 6,800,000 ug/kg. Trichloroethene exhibited concentrations of 6,900,000 and 9,100,000 ug/kg, and m-xylene exhibited concentrations of 2,400,000 and 4,000,000 ug/kg. The parent materials exhibited 1,1,1-trichloroethane concentrations of 830,000 and 1,400,000 ug/kg. Ethylbenzene, 1,2,4-trimethylbenzene and o-xylene were detected at concentrations ranging from 270,000 to 1,000,000 ug/kg. Several other volatile organic compounds were also found at detectable concentrations lower than 200,000 ug/kg.

SPLP Volatile Organic Analyses

The results of SPLP volatile organic analyses, as presented in Table 22, indicate that trichloroethene was detected at the highest leachable concentrations of 87,000 and 130,000 ug/L. Toluene was detected at concentrations of 49,000 and 79,000 ug/L, while m-xylene was detected at concentrations of 11,000 and 35,000 ug/L. Tetrachloroethene was also detected at very high concentrations of 15,000 and 55,000 ug/L. o-Xylene, 1,1,1-trichloroethane, 4-methyl-2-pentanone, ethylbenzene, 1,2-dichloroethane, 1,1-dichloroethane, chloroform, chlorobenzene, methylene chloride, 2-butanone and acetone were detected at concentrations ranging from 1,600 to 21,000 ug/L. Other compounds found at detectable concentrations of less than 2,400 ug/L include benzene, bromomethane, 1,2-dichlorobenzene, cis-1,2-dichloroethane, 1,2-dichloropropane, isopropyl benzene, naphthalene, n-propyl benzene, 1,2,3-trichlorobenzene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene. All remaining compounds were not detected in the samples.

Total Pesticide and PCB Analyses

The results of total pesticide and PCB analyses are presented in Table 23. A review of the pesticide results indicates that both parent materials exhibited non-detectable concentrations for all pesticide compounds. The results of total PCB analyses indicate that Aroclor-1242 was the only aroclor detected at concentrations of 580,000 and 600,000 ug/kg. All remaining aroclors were not detected in the samples.

SPLP Pesticide and PCB Analyses

Table 24 presents the results of SPLP pesticide and PCB analyses. The results indicate that both parent materials exhibited non-detectable concentrations of all pesticide compounds. The results of SPLP PCB analyses indicate that Aroclor-1242 was detected in each of the parent materials at concentrations of 58 and 51 ug/L. All remaining aroclor compounds were not detected in the samples.

Total TAL Metals and Chloride Analyses

The results of TAL metals analyses, as presented in Table 25, indicate that the metals found at the parent materials at the highest concentrations were aluminum, calcium, iron and sodium. These metals were found at concentrations ranging from 12,000 to 46,000 mg/kg. Lead was found at concentrations of 810 and 750 mg/kg, while arsenic was found at concentrations of 12 and 11 mg/kg. Additional metals found at concentrations ranging from 1,100 to 5,300 mg/kg include copper, magnesium, potassium and zinc. All remaining metals were detected at concentrations of less than 810 mg/kg. Chloride was detected in each of the two parent materials at concentrations of 9,400 and 10,000 mg/kg.

SPLP TAL Metals Analyses

The results of SPLP TAL metals analyses are presented in Table 26. A review of the results indicates that the parent materials exhibited a leachable sodium concentration of 480 mg/L, leachable iron concentrations 13 and 26 mg/L, leachable calcium concentrations of 31 and 50 mg/L and leachable aluminum concentrations of 8.4 and 27 mg/L. Lead was detected at a leachable concentration of 0.94 and 1.6 mg/L, while arsenic was detected at leachable concentrations of 0.027 and 0.055 mg/L. Copper, magnesium, potassium and zinc were detected at concentrations ranging from 2.9 to 10 mg/L. All remaining metals were found at concentrations less than 1 mg/L.

The results of parent material characterization testing performed during Phase IV of the study indicates that the materials are similar to those evaluated during Phase I: Baseline Characterization. Once Kiber had confirmed that the parent materials were representative of the untreated composite material, Kiber proceeded with air stripping of the parent materials.

5.3 AIR STRIPPING / IRON AMENDMENT

Air stripping was performed as pretreatment in an effort to reduce volatile organic concentrations prior to addition of the stabilization reagents. Air stripping pretreatment had been successful in previous phases of the treatability study at reducing volatile organic concentrations and improving the physical characteristics of the untreated composite. As a result, air stripping pretreament was carried forward to Phase IV testing.

Air stripping was performed in accordance with previously discussed protocols on the parent materials. Prior to performing air stripping treatment, Kiber separated each of the two parent materials into two equal aliquots, for a total of four separate aliquots of material. Once two aliquots of Parent material A and two aliquots of Parent Material B existed, Kiber performed air stripping separately on each of the aliquots of untreated material. Specifically, the aliquots were air stripped for a period of 120 minutes using a flow rate of 5 lpm. The four aliquots of untreated material were then given mixture numbers. The following mixtures were developed using the corresponding parent materials during this phase of testing

Mixture No.	Amended	Material	Reagent Type and Addition
2964-021	No Iron	Parent A	10% Type I Portland Cement
2964-022	No Iron	Parent B	10% Type I Portland Cement / 10% Lime
2964-023	Iron	Parent A	10% Type I Portland Cement
2964-024	Iron	Parent B	10% Type I Portland Cement / 10% Lime

Table 27 includes the mixtures developed during this phase of testing. This table includes Kiber's sample numbers, material type, reagent type, and reagent and water addition rates. Once air stripping was complete, Kiber performed iron amendment on the Parent B materials. Parent Material A was mixed in a manner similar to the mixing that occurred in Parent Material B during iron amendment in an effort to mimic potential volatilization of organics that may have occurred solely due to mixing. Note that iron was added at a 10.5% addition rate by weight, as was performed during Phase III of the treatability study. Once each of the materials had been mixed sufficiently to produce a homogenous material, Kiber allowed the parent materials to sit for a period of 3 days. Upon reaching 3 days, each mixture was sampled and subjected to characterization analyses. Characterization analyses were performed at this time to identify the effect of air stripping and iron amendment on the untreated composite material. The following analytical characterization testing was performed on each of the four mixtures in accordance with the specified test methods:

Total Volatiles	EPA Method 8260B
Total PCBs	EPA Method 8081
Total Chloride	EPA Method 325.2

The results of characterization testing performed on the mixtures after air stripping and iron amendment are included in Tables 28 and 29. Table 28 includes the results of total volatile organic analyses, and Table 29 includes the results of total PCB and chloride analyses. Analytical data reports are included in Appendix E.

Total Volatile Organic Analyses

The results of total volatile organic analyses, as presented in Table 28, indicate that the mixtures exhibited similar volatile organic concentrations to those exhibited by the materials previously air stripped during Phase III. Tetrachloroethene was detected at concentrations ranging from 430,000 to 980,000 ug/kg, toluene was detected at concentrations ranging from 220,000 to 620,000 ug/kg, trichloroethene was detected at concentrations ranging from 150,000 to 510,000 ug/kg, m-xylene concentrations ranging from 430,000 to 850,000 ug/kg, and o-xylene concentrations ranging from 140,000 to 270,000 ug/kg. Additional compounds detected at concentrations ranging from 33,000 to 190,000 ug/kg include 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, naphthalene, ethylbenzene and 1,2-dichlorobenzene. Chlorobenzene, 2-butanone, isopropyl benzene, n-propyl benzene and 1,1,1-trichloroethane were found at concentrations ranging from 5,600 to 49,000 ug/L.

Total PCB and Chloride Analyses

Table 29 presents the results of total PCB and chloride analyses. The results of total PCB analyses indicate that the mixtures exhibited Aroclor-1242 concentrations ranging from 690,000 to 1,700,000 ug/kg. To clarify, mixture 021 exhibited an Aroclor-1242 concentration of 690,000 ug/kg, while the remaining three mixtures exhibited Aroclor-1242 concentrations ranging from 1,200,000 to 1,700,000 ug/kg. Total chloride concentrations were found in the range of 5,800 to 7,700 mg/kg.

The previously discussed results do not indicate any correlations as to the benefit of iron addition. However, the results of air stripping were similar to those obtained during Phase III and thus indicate a significant decrease in volatile organic concentrations as a result.

5.4 STABILIZATION / SOLIDIFICATION TREATMENT

Once the mixtures had been allowed to sit for 3 days after air stripping and iron amendment, Kiber proceeded with s/s reagent addition. As previously outlined, the mixtures developed by Kiber are presented in Table 27. The mixtures were developed on each of the corresponding parent materials in accordance with previously discussed protocols. Immediately following mixture development, the treated materials were compacted into cylindrical molds for curing. The materials were allowed to cure for a period of 28 days in a humid environment. Once curing was complete, Kiber subjected each of the four mixtures to comprehensive analytical and physical characterization analyses. Specifically, the characterization analyses performed on each of the four treated materials were as follows:

Total Volatiles	EPA Method 8260B
SPLP Volatiles	EPA Methods 1312/8260B
Total Pesticides	EPA Method 8081
SPLP Pesticides	EPA Methods 1312/8081
Total PCBs	EPA Method 8081
SPLP PCBs	EPA Methods 1312/8082
Total TAL Metals	EPA Methods 6010B/7471
SPLP TAL Metals	EPA Methods 1312/6010B/7470
Total Chloride	EPA Method 325.2
Ignitability	EPA Method 1010
Unconfined Compressive Strength	ASTM D 2166
Bulk Density	ASTM D 5057
Moisture Content	ASTM D 2216
Volumetric Increase	NA

The results of comprehensive characterization analyses are included in Tables 30 through 36. Total volatile organic and SPLP volatile organic analyses are presented in Tables 30 and 31, respectively. Total pesticide, PCB, chloride and flash point results are presented in Table 32. Table 33 presents the results of SPLP PCB and pesticide results. Total TAL metals results are presented in Table 34, and SPLP TAL metals results are presented in Table 35. The results of unconfined compressive strength testing are included in Table 36. Analytical and physical data reports are included in Appendix E.

Volatile Organic Analyses

The results of total volatile organic analyses, as presented in Table 30, indicate that the treated materials exhibited significantly lower concentrations than those observed from previous phases of the treatability study. The compounds found at the highest concentrations include tetrachloroethane, toluene, trichloroethene and m-xylene. Tetrachloroethene and m-xylene were found at concentrations ranging from 120,000 to 330,000 ug/kg. o-Xylene, 1,2,4-trimethylbenzene, naphthalene, ethylbenzene, and 1,2-dichlorobenzene were found at concentrations ranging from 32,000 to 190,000 ug/kg. Additional compounds found at concentrations ranging from 3,000 to 27,000 mg/kg include 1,3,5-trimethylbenzene, isopropyl benzene, n-propyl benzene, chlorobenzene and n-butyl benzene. Trichloroethene was detected at concentrations of 17,000 ug/kg, 140,000 ug/kg, 36,000 ug/kg and 41,000 ug/kg. Several other compounds were detected in the treated materials at lower concentrations.

SPLP Volatile Organic Analyses

Table 31 presents the results of SPLP volatile organic analyses performed on the treated materials. A review of the results indicates that the treated materials exhibited tetrachloroethene concentrations ranging from 670 to 2,200 ug/L, toluene concentrations ranging from 630 to 4,100 ug/L, trichloroethene concentrations ranging from 120 to 2,600 ug/L, and m-xylene concentrations ranging from 1,300 to 4,800 ug/L. Ethylbenzene and o-xylene were detected at concentrations ranging from 490 to 2,100 ug/L. Other compounds detected at leachable concentrations ranging from 160 to 870 ug/L include 1,2,4-trimethylbenzene, naphthalene, 1,2-dichlorobenzene and acetone. Several other volatile organic compounds were found at low detectable concentrations in the treated materials.

Total PCBs, Pesticides, Chloride and Ignitability

Table 32 presents the results of total PCB, pesticide, chloride and ignitability analyses performed on the treated materials. A review of the results of total PCB analyses indicates that the treated materials exhibited Aroclor-1242 concentrations ranging from 290,000 to 450,000 ug/kg. All remaining PCB and pesticide compounds were not detected in the samples. Total chloride results for the treated materials ranged from 3,000 to 5,800 mg/kg. The results of ignitability indicated that all treated materials had flash points in excess of 95 °C.

SPLP PCB and Pesticide Analyses

The results of SPLP pesticide and PCB analyses are presented in Table 33. A review of the data reveals that as seen previously with total analyses, all pesticide compounds were not detected in the samples. The only aroclor detected included Aroclor-1242. Aroclor-1242 was detected at concentrations ranging from 0.52 to 2.0 ug/L. All remaining aroclors were found below detectable limits.

Total TAL Metals Analyses

The results of total TAL metals analyses are presented in Table 34. Calcium exhibited the highest concentrations ranging from 69,000 to 120,000 mg/kg, and iron exhibited concentrations ranging from 19,000 to 130,000. Note that the mixtures developed with iron exhibited much higher concentrations of iron than those developed without iron. Additionally, the mixtures developed with hydrated lime exhibited much higher calcium concentrations than those developed with only cement. Aluminum and sodium concentrations ranged from 9,000 to 15,000 mg/kg, while zinc, copper and potassium concentrations ranged from 900 to 5,830 mg/kg. Lead was detected in the treated materials at concentrations ranging from 590 to 1,100 mg/kg, while arsenic was detected at concentrations ranging from 13 to 35 mg/kg. Barium and manganese were detected in the treated materials at concentrations ranging from 291 to 676 mg/kg. Several other metals were detected at total concentrations of less than 300 mg/kg.

SPLP TAL Metals Analyses

Table 35 presents the results of SPLP TAL metals analyses performed on the 28 day cure treated materials. The majority of the metals were detected at concentrations of less than 1 mg/L. Calcium and sodium were detected at the highest concentrations ranging from 150 to 470 mg/L. Potassium concentrations ranged from 8.4 to 10 mg/L, while SPLP copper concentrations ranged from 1.4 to 3.1 mg/L. Note that SPLP lead concentrations were non-detectable in the mixtures developed with cement, and exhibited concentrations of 0.17 and 0.096 mg/L in the mixtures developed with a combination of cement and hydrated lime. SPLP arsenic concentrations ranged from 0.0098 to 0.014 mg/L. All remaining metals were found at SPLP concentrations of less than 0.41 mg/L.

Unconfined Compressive Strength Testing

Unconfined compressive strength results are presented in Table 36. A review of the results indicates that the treated materials exhibited strengths ranging from 42 to 84 lbs/in^2. The materials developed with Type I Portland cement alone exhibited strengths of 71 and 84 lbs/in^2, while the materials developed with a combination of cement and lime exhibited strengths of 53 and 42 lbs/in^2. Volumetric expansion results indicate that the materials developed with a combination of cement and lime exhibited much higher increases than those developed with only cement. Specifically, the mixtures developed with cement exhibited volumetric increases of 4 and 7%, while the mixtures developed with a combination of cement and lime exhibited increases of 32%. The larger volume increase is likely due to the low density of the hydrated lime reagent and subsequent bulking that takes place.

A review of the results of treated evaluations performed on the four treated materials indicates that a combination of air stripping and s/s treatment were capable of reducing the leachable concentrations of both organic and inorganic compounds while significantly improving the physical properties of the untreated material. Additional review of the treated evaluations indicate that iron was not capable of further reducing leachable organic or inorganic concentrations and as a result the additional cost necessary for full-scale implementation would not be cost effective.

5.5 PHASE IV CONTROL SAMPLE

In order to identify the relative reduction in contaminants solely as a result of handling, mixing and exposure to the environment, Kiber utilized a control sample throughout all of Phase IV testing. The control sample was obtained from the same untreated bucket as the Phase IV parent materials. Once a sufficient aliquot had been sampled from the original untreated bucket a sample was obtained and subjected to analytical characterization analyses. The remaining control sample was then placed into a Ziploc bag and allowed to set open any time that the mixtures were exposed to the outside air. When the mixtures were mixed or amended with iron, the control sample was also mixed to mimic the treatment process. During the three days after iron addition, the mixtures and control sample were sealed in Ziploc bags. Note that Kiber removed as much air as possible prior to sealing the Ziploc bags. After three days, all of the Ziploc bags were opened and the control sample was sampled in addition to the mixtures. While the mixtures were treated with the specified stabilization reagents, the control sample was again mixed to simulate the mixing in of reagents. Upon completion of mixture development, all materials were again sealed in Ziploc bags for a period of 28 days. Upon reaching 28 days of curing the control sample was again sampled and subjected to analytical analyses. At each sampling interval, the control sample was subjected to the following analytical analyses in accordance with the referenced test methods:

Total Volatiles	EPA Method 8260B
Total PCBs	EPA Method 8081
Total Chloride	EPA Method 325.2

The results of characterization analyses performed on the control samples are presented in Tables 37 and 38. Table 37 includes the results of total volatile organic analyses, and Table 38 includes the results of total PCB and chloride analyses. Analytical data reports are included in Appendix E.

Volatile Organic Analyses

A review of the results of total volatile organic analyses performed on the control samples, as presented in Table 37, indicate reduction in volatile organic concentrations from the initial to the final control. Specifically, tetrachloroethene reduced from 4,300,000 ug/kg to 1,400,000 ug/kg, while toluene reduced from 4,100,000 to 790,000 ug/kg. Trichloroethene concentrations reduced from 5,500,000 ug/kg to 710,000 ug/kg, and m-xylene concentrations reduced from 2,800,000 to 920,000 ug/kg. Several other compounds exhibited a reduction in concentrations from the initial control sample to the final control sample.

Total PCB and Chloride Analyses

Table 38 presents the results of total PCB and chloride analyses performed on the control sample. Note that Aroclor-1242, which was the only aroclor compound detected, was found in the initial control sample at 1,600,000 ug/kg and in the final control sample at 620,000 ug/kg. Total chloride concentrations increased from 2,700 mg/kg in the initial control sample to 8,500 mg/kg in the final control sample.

Due to the heterogeneity of the material it is difficult to identify whether these concentrations represent a true reduction or whether the reduction is a result of analyzing a less contaminated aliquot during the analyses of the final control sample.

6.0 QUALITY ASSURANCE / QUALITY CONTROL

Kiber maintains strict Quality Assurance (QA) and Quality Control (QC) programs as part of Kiber's standard operating procedures. The QA/QC program for the 216 Paterson Plank Road site treatability study had two primary objectives 1) to validate the quality of each analysis conducted in accordance with the referenced protocols, and 2) to evaluate the effectiveness of each treatment process on the chemical treatment of the site materials. The treatability and analytical testing procedures implemented throughout the study were known, tested and approved EPA and ASTM methodologies.

The objectives of the treatability study were achieved for treatability testing through 1) calibration of the associated equipment, and 2) supervision and review by qualified technical personnel. All treatability testing was supervised by personnel experienced in both laboratory evaluations and full-scale application of the treatment processes.

All equipment associated with the treatability testing is calibrated on a regular basis, as specified by the manufacturer. Daily monitoring and calibration was also performed on common laboratory equipment including pH meters, ovens, and balances.

The analytical QA/QC program was developed in accordance with EPA's Level III QA/QC standards as outlined in *Preparation Aids for the Development of Category III Quality Assurance Project Plans.* Specifically, the objectives of the QA/QC program were to ensure that the data generated was comparable, accurate, reproducible, valid, and defensible. All QA/QC testing was applied to the initial phase of the 216 Paterson Plank Road site treatability study on a batch-specific basis. The program included analyses of method blanks, duplicates, blank spikes, laboratory control samples, and surrogate recoveries, as appropriate. Complete QA/QC data is reported with the full data reports presented in each of the referenced appendices. Any sample-specific observations are reported on the appropriate data reports.

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TABLES

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 1
Phase I: Baseline Characterization
Summary of Total Volatile Organic Analyses - EPA Method 8260B

ANALYTICAL PARAMETER	RESULTS (ug/kg) (1)					
	A		B		C	
	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES						
Acetone	300,000 J	2,000,000	220,000 J	1,700,000	320,000 J	2,400,000
Benzene	43,000 J	99,000	31,000 J	87,000	45,000 J	120,000
Bromobenzene	-	99,000	-	87,000	-	120,000
Bromochloromethane	-	99,000	-	87,000	-	120,000
Bromodichloromethane	-	99,000	-	87,000	-	120,000
Bromoform	-	99,000	-	87,000	-	120,000
Bromomethane	-	200,000	-	170,000	-	240,000
2-butanone	240,000 J	2,000,000	170,000 J	1,700,000	-	2,400,000
n-Butylbenzene	-	99,000	-	87,000	-	120,000
s-Butylbenzene	-	99,000	-	87,000	-	120,000
t-Butlybenzene	-	99,000	-	87,000	-	120,000
Carbon disulfide	-	99,000	-	87,000	-	120,000
Carbon tetrachloride	-	99,000	-	87,000	-	120,000
Chlorobenzene	210,000	99,000	160,000	87,000	210,000	120,000
Chorodibromomethane	-	99,000	-	87,000	-	120,000
Chloroethane	-	200,000	-	170,000	-	240,000
2-Chloroethyl vinyl ether	-	200,000	-	170,000	-	240,000
Chloroform	140,000	99,000	97,000	87,000	140,000	120,000
Chloromethane	-	200,000	-	170,000	-	240,000
2-Chlorotoluene	-	99,000	-	87,000	-	120,000
4-Chlorotoluene	-	99,000	-	87,000	-	120,000
1,2-Dibromo-3-Chloropropane	-	99,000	-	87,000	-	120,000
1,2-Dibromoethane	-	99,000	-	87,000	-	120,000
Dibromomethane	-	99,000	-	87,000	-	120,000
1,2-Dichlorobenzene	190,000	99,000	160,000	87,000	170,000	120,000
1,3-Dichlorobenzene	-	99,000	-	87,000	-	120,000
1,4-Dichlorobenzene	-	99,000	-	87,000	-	120,000
Dichlorodifluoromethane	-	200,000	-	170,000	-	240,000
1,1-Dichloroethane	130,000	99,000	100,000	87,000	170,000	120,000
1,2-Dichloroethane	76,000 J	99,000	58,000 J	87,000	69,000 J	120,000
1,1-Dichloroethene	-	99,000	-	87,000	-	120,000
cis-1,2-Dichloroethene	41,000 J	99,000	32,000 J	87,000	53,000 J	120,000
trans-1,2-Dichloroethene	-	99,000	-	87,000	-	120,000
1,2-Dichloropropane	15,000 J	99,000	10,000 J	87,000	15,000 J	120,000
1,3-Dichloropropane	-	99,000	-	87,000	-	120,000

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 1
Phase I: Baseline Characterization
Summary of Total Volatile Organic Analyses - EPA Method 8260B

ANALYTICAL PARAMETER	RESULTS (ug/kg) (1)					
	A		B		C	
	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES						
2,2-Dichloropropane	-	99,000	-	87,000	-	120,000
cis-1,3-Dichloropropene	-	99,000	-	87,000	-	120,000
trans-1,3-Dichloropropene	-	99,000	-	87,000	-	120,000
1,1-Dichloropropene	-	99,000	-	87,000	-	120,000
Ethylbenzene	980,000	99,000	740,000	87,000	1,100,000	120,000
2-Hexanone	-	200,000	-	170,000	-	240,000
Hexachlorobutadiene	-	99,000	-	87,000	-	120,000
Isopropyl benzene	36,000 J	99,000	28,000 J	87,000	42,000 J	120,000
p-isopropyltoluene	-	99,000	-	87,000	13,000 J	120,000
4-Methyl-2-pentanone (MIBK)	310,000	200,000	220,000	170,000	290,000	240,000
Methylene chloride	140,000	99,000	100,000	87,000	140,000	120,000
Naphthalene	69,000 J	200,000	58,000 J	170,000	80,000 J	240,000
n-Propyl benzene	100,000	99,000	78,000 J	87,000	110,000 J	120,000
Styrene	-	99,000	-	87,000	-	120,000
1,1,1,2-Tetrachloroethane	-	99,000	-	87,000	-	120,000
1,1,2,2-Tetrachloroethane	-	99,000	-	87,000	-	120,000
Tetrachloroethene	6,600,000	99,000	4,900,000	87,000	7,100,000	120,000
Toluene	6,400,000	99,000	5,200,000	87,000	7,500,000	120,000
1,2,3-Trichlorobenzene	-	99,000	-	87,000	-	120,000
1,2,4-Trichlorobenzene	-	99,000	-	87,000	6,800 J	120,000
1,1,1-Trichloroethane	990,000	99,000	790,000	87,000	930,000	120,000
1,1,2-Trichloroethane	-	99,000	-	87,000	-	120,000
Trichloroethene	8,800,000	99,000	6,800,000	87,000	9,500,000	120,000
Trichlorofluoromethane	-	200,000	-	170,000	-	240,000
1,2,3-Trichloropropane	-	99,000	-	87,000	-	120,000
1,2,4-Trimethylbenzene	120,000	99,000	95,000	87,000	130,000	120,000
1,3,5-Trimethylbenzene	140,000	99,000	110,000	87,000	160,000	120,000
Vinyl Acetate	-	200,000	-	170,000	-	240,000
Vinyl Chloride	-	200,000	-	170,000	-	240,000
o-xylene	1,100,000	99,000	820,000	87,000	1,200,000	120,000
m-xylene	4,100,000	99,000	3,100,000	87,000	4,300,000	120,000
p-xylene	-	99,000	-	87,000	-	120,000

(1) A, B and C represent triplicate aliquots of the untreated material.
DL Detection Limit
J Estimated Value
\- Non Detectable concentrations

2964_204

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 2
Phase I: Baseline Characterization
Summary of SPLP Volatile Organic Analyses - EPA Methods 1312/8260B

ANALYTICAL PARAMETER	RESULTS (ug/L) (1)					
	A		B		C	
	Conc.	DL	Conc.	DL	Conc.	DL
I. SPLP VOLATILES						
Acetone	13,000	10,000	12,000	10,000	13,000	10,000
Benzene	710	500	830	500	680	500
Bromobenzene	-	500	-	500	-	500
Bromochloromethane	-	500	-	500	-	500
Bromodichloromethane	-	500	-	500	-	500
Bromoform	-	500	-	500	-	500
Bromomethane	-	1,000	-	1,000	-	1,000
2-Butanone	10,000	10,000	9,300	10,000	10,000	10,000
n-Butylbenzene	67 J	500	-	500	-	500
s-Butylbenzene	51 J	500	-	500	-	500
t-Butlybenzene	45 J	500	-	500	-	500
Carbon disulfide	-	500	-	500	-	500
Carbon tetrachloride	-	500	-	500	-	500
Chlorobenzene	1,500	500	1,400	500	1,500	500
Chorodibromomethane	-	500	-	500	-	500
Chloroethane	-	1,000	-	1,000	-	1,000
2-Chloroethyl vinyl ether	-	1,000	-	1,000	-	1,000
Chloroform	3,100	500	4,200	500	3,400	500
Chloromethane	-	1,000	-	1,000	-	1,000
2-Chlorotoluene	-	500	-	500	-	500
4-Chlorotoluene	-	500	-	500	-	500
1,2-Dibromo-3-Chloropropane	-	500	-	500	-	500
1,2-Dibromoethane	-	500	-	500	-	500
Dibromomethane	-	500	-	500	-	500
1,2-Dichlorobenzene	500 J	500	430 J	500	530	500
1,3-Dichlorobenzene	-	500	-	500	-	500
1,4-Dichlorobenzene	-	500	-	500	-	500
Dichlorodifluoromethane	-	1,000	-	1,000	-	1,000
1,1-Dichloroethane	3,200	500	3,400	500	2,800	500
1,2-Dichloroethane	3,200	500	3,000	500	3,900	500
1,1-Dichloroethene	94 J	500	98 J	500	91 J	500
cis-1,2-Dichloroethene	1,000	500	1,100	500	880	500
trans-1,2-Dichloroethene	-	500	-	500	-	500
1,2-Dichloropropane	280 J	500	380 J	500	300 J	500
1,3-Dichloropropane	-	500	-	500	-	500

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 2
Phase I: Baseline Characterization
Summary of SPLP Volatile Organic Analyses - EPA Methods 1312/8260B

ANALYTICAL PARAMETER	RESULTS (ug/L) (1)					
	A		B		C	
	Conc.	DL	Conc.	DL	Conc.	DL
I. SPLP VOLATILES						
2,2-Dichloropropane	-	500	-	500	-	500
cis-1,3-Dichloropropene	-	500	-	500	-	500
trans-1,3-Dichloropropene	-	500	-	500	-	500
1,1-Dichloropropene	-	500	-	500	-	500
Ethylbenzene	2,900	500	2,900	500	3,000	500
2-Hexanone	-	1,000	-	1,000	-	1,000
Hexachlorobutadiene	49 J	500	-	500	-	500
Isopropyl benzene	57 J	500	38 J	500	45 J	500
p-isopropyltoluene	53 J	500	-	500	-	500
4-Methyl-2-pentanone (MIBK)	12,000	1,000	12,000	1,000	11,000	1,000
Methylene chloride	3,800	500	5,000	500	5,000	500
Naphthalene	250 J	1,000	150 J	1,000	150 J	1,000
n-Propyl benzene	110 J	500	84 J	500	110 J	500
Styrene	-	500	-	500	-	500
1,1,1,2-Tetrachloroethane	-	500	-	500	-	500
1,1,2,2-Tetrachloroethane	-	500	-	500	-	500
Tetrachloroethene	14,000	500	15,000	500	16,000	500
Toluene	50,000	5,000	51,000	5,000	49,000	5,000
1,2,3-Trichlorobenzene	120 J	500	-	500	-	500
1,2,4-Trichlorobenzene	95 J	500	-	500	-	500
1,1,1-Trichloroethane	13,000	500	14,000	500	14,000	500
1,1,2-Trichloroethane	190 J	500	300 J	500	240 J	500
Trichloroethene	84,000	5,000	89,000	5,000	86,000	5,000
Trichlorofluoromethane	-	1,000	-	1,000	-	1,000
1,2,3-Trichloropropane	-	500	-	500	-	500
1,2,4-Trimethylbenzene	470 J	500	460 J	500	550	500
1,3,5-Trimethylbenzene	150 J	500	130 J	500	160 J	500
Vinyl Acetate	-	1,000	-	1,000	-	1,000
Vinyl Chloride	290 J	1,000	330 J	1,000	260 J	1,000
o-xylene	3,300	500	3,400	500	3,400	500
m-xylene	10,000	500	11,000	500	11,000	500
p-xylene	-	500	-	500	-	500

(1) A, B and C represent triplicate aliquots of the untreated material.
DL Detection Limit
J Estimated Value
\- Non Detectable concentrations

2964_209

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 3
Phase I: Baseline Characterization
Summary of Total Pesticide / PCB Analyses - EPA Method 8081/8082

ANALYTICAL PARAMETER	RESULTS (ug/kg) (1)					
	A		B		C	
	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL PESTICIDES						
alpha-BHC	-	260	-	230	-	310
beta-BHC	-	260	-	230	-	310
delta-BHC	-	260	-	230	-	310
Heptachlor	-	260	-	230	-	310
Aldrin	-	260	-	230	-	310
Heptachlor epoxide	-	260	-	230	-	310
Endosulfan I	-	260	-	230	-	310
Dieldrin	4,700	520	9,600	460	13,000	620
4,4'-DDE	-	520	-	460	-	620
Endrin	-	520	-	460	-	620
Endosulfan II	-	520	-	460	-	620
4,4'-DDD	-	520	-	460	-	620
Endosulfan Sulfate	-	520	-	460	-	620
4,4'-DDT	-	520	-	460	-	620
Methoxychlor	-	2,600	-	2,300	-	3,100
Endrin Ketone	-	520	-	460	-	620
Endrin aldehyde	-	520	-	460	-	620
alpha-Chlordane	-	260	-	230	-	310
gamma-Chlordane	-	260	-	230	-	310
Toxaphene	-	5,200	-	4,600	-	6,200
gamma-BHC (Lindane)	-	260	-	230	-	310
II. TOTAL PCBs						
Aroclor-1016	-	52	-	46	-	62
Aroclor-1221	-	52	-	46	-	62
Aroclor-1232	-	52	-	46	-	62
Aroclor-1242	630,000	260,000	330,000	46,000	990,000	310,000
Aroclor-1248	-	52	-	46	-	62
Aroclor-1254	-	52	-	46	-	62
Aroclor-1260	-	52	-	46	-	62

(1) A, B and C represent triplicate aliquots of the untreated material.
DL Detection Limit
\- Non Detectable Concentrations

2964_206

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 4
Phase I: Baseline Characterization
Summary of SPLP Pesticide / PCB Analyses - EPA Methods 1312/8081/8082

ANALYTICAL PARAMETER	RESULTS (ug/L) (1)					
	A		B		C	
	Conc.	DL	Conc.	DL	Conc.	DL
I.SPLP PESTICIDES						
alpha-BHC	-	5.0	-	5.0	-	5.0
beta-BHC	-	5.0	-	5.0	-	5.0
delta-BHC	-	5.0	-	5.0	-	5.0
Heptachlor	-	5.0	-	5.0	-	5.0
Aldrin	-	5.0	-	5.0	-	5.0
Heptachlor epoxide	-	5.0	-	5.0	-	5.0
Endosulfan I	-	5.0	-	5.0	-	5.0
Dieldrin	60	10	43	10	45	10
4,4'-DDE	-	10	-	10	-	10
Endrin	-	10	-	10	-	10
Endosulfan II	-	10	-	10	-	10
4,4'-DDD	-	10	-	10	-	10
Endosulfan Sulfate	-	10	-	10	-	10
4,4'-DDT	-	10	-	10	-	10
Methoxychlor	-	50	-	50	-	50
Endrin Ketone	-	10	-	10	-	10
Endrin aldehyde	-	10	-	10	-	10
alpha-Chlordane	-	5.0	-	5.0	-	5.0
gamma-Chlordane	-	5.0	-	5.0	-	5.0
Toxaphene	-	100	-	100	-	100
gamma-BHC (Lindane)	-	5.0	-	5.0	-	5.0
II. SPLP PCBs						
Aroclor-1016	-	0.50	-	0.50	-	0.50
Aroclor-1221	-	0.50	-	0.50	-	0.50
Aroclor-1232	-	0.50	-	0.50	-	0.50
Aroclor-1242	5,000	500	3,300	500	4,400	500
Aroclor-1248	-	0.50	-	0.50	-	0.50
Aroclor-1254	-	0.50	-	0.50	-	0.50
Aroclor-1260	-	0.50	-	0.50	-	0.50

(1) A, B and C represent triplicate aliquots of the untreated material.
DL Detection Limit
\- Non Detectable Concentrations

2964_207

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 5
Phase I: Baseline Characterization
Summary of Additional Chemical and Physical Analyses

ANALYTICAL PARAMETER	UNIT	RESULTS (1) A	B	C
I. CHEMICAL ANALYSES				
Total Lead	mg/kg	860	770	1,200
SPLP Lead	mg/L	2.6	3.2	3.6
Total Arsenic	mg/kg	13	13	18
SPLP Arsenic	mg/L	< 0.10	< 0.10	< 0.10
Total Chloride	mg/kg	1,200	2,700	5,700
Material pH	s.u.	8.9	9.2	9.1
II. PHYSICAL PROPERTIES				
Ignitability, Flash Point	°C	35	39	39
Moisture Content, Dry Basis	%	58	62	59
Bulk Density	lb/ft³	95	95	95
Bulk Specific Gravity	-	1.5	1.5	1.5

(1) A, B, and C represent multiple aliquots of the untreated material.
- Not applicable or Not Analyzed

2964_208

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 6
Phase II: Screening Tests
Summary of Mixture Development and Monitoring

KIBER SAMPLE No.	REAGENT TYPE (1)	REAGENT ADDITION (%) (2)	WATER ADDITION (%) (2)	PENETROMETER STRENGTH TESTING ($tons/ft^2$)						
				1 Day	2 Day	3 Day	7 Day	14 Day	19 Day	21 Day
2964-001	Type I Portland Cement	10	8	<0.5	<0.5	<0.5	<0.5	0.5	0.5	1.5
2964-002	Type I Portland Cement	20	16	<0.5	<0.5	<0.5	<0.5	1.0	1.0	1.0
2964-003	Type I Portland Cement	30	17.5	<0.5	<0.5	<0.5	<0.5	0.5	0.5	0.5
2964-004	Type I Portland Cement	40	20	<0.5	<0.5	<0.5	<0.5	0.5	1.0	2.0
2964-005	Type I Portland Cement	50	25	<0.5	<0.5	<0.5	<0.5	0.5	1.5	2.5
2964-006	Type I Portland Cement / Organophillic Clay	20 / 3	16	<0.5	<0.5	<0.5	<0.5	1.0	1.5	1.5
2964-007	Type I Portland Cement / Organophillic Clay	40 / 3	28	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.5
2964-008	Type I Portland Cement / Organophillic Clay	20 / 5	25	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.5
2964-009	Type I Portland Cement / Organophillic Clay	40 / 5	27	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	1.0
2964-010	Type I Portland Cement / Organophillic Clay	40 / 7	30	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	1.0
2964-011	Type I Portland Cement / Hydrated Lime	10 / 10	27.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.5
2964-012	Type I Portland Cement / Hydrated Lime	20 / 20	40	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.5

(1) All reagents will be blended dry, slurried with water and added to the untreated material and blended.
(2) For a mixture with 10% reagent addition and 10% water addition, 20 grams of reagent will be slurried with 20 grams of water and added to 200 grams of untreated material.

2964_213

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 7
Phase II: Screening Tests
Summary of Unconfined Compressive Strength Testing - ASTM D 2166

KIBER SAMPLE No.	REAGENT TYPE (1)	REAGENT ADDITION (%) (2)	WATER ADDITION (%) (2)	UNCONFINED COMPRESSIVE STRENGTH TESTING (UCS) (3) Moisture Content (%)	Bulk Density (lbs/ft²)	Dry Density (lbs/ft²)	UCS (lbs/in²)
2964-001	Type I Portland Cement	10	8	42	101	71	14
2964-002	Type I Portland Cement	20	16	44	100	69	11
2964-003	Type I Portland Cement	30	17.5	-	-	-	-
2964-004	Type I Portland Cement	40	20	41	107	76	11
2964-005	Type I Portland Cement	50	25	37	106	77	14
2964-006	Type I Portland Cement / Organophillic Clay	20 / 3	16	44	102	71	14
2964-007	Type I Portland Cement / Organophillic Clay	40 / 3	28	-	-	-	-
2964-008	Type I Portland Cement / Organophillic Clay	20 / 5	25	51	97	64	6
2964-009	Type I Portland Cement / Organophillic Clay	40 / 5	27	44	101	70	12
2964-010	Type I Portland Cement / Organophillic Clay	40 / 7	30	-	-	-	-
2964-011	Type I Portland Cement / Hydrated Lime	10 / 10	27.5	-	-	-	-
2964-012	Type I Portland Cement / Hydrated Lime	20 / 20	40	52	95	63	15

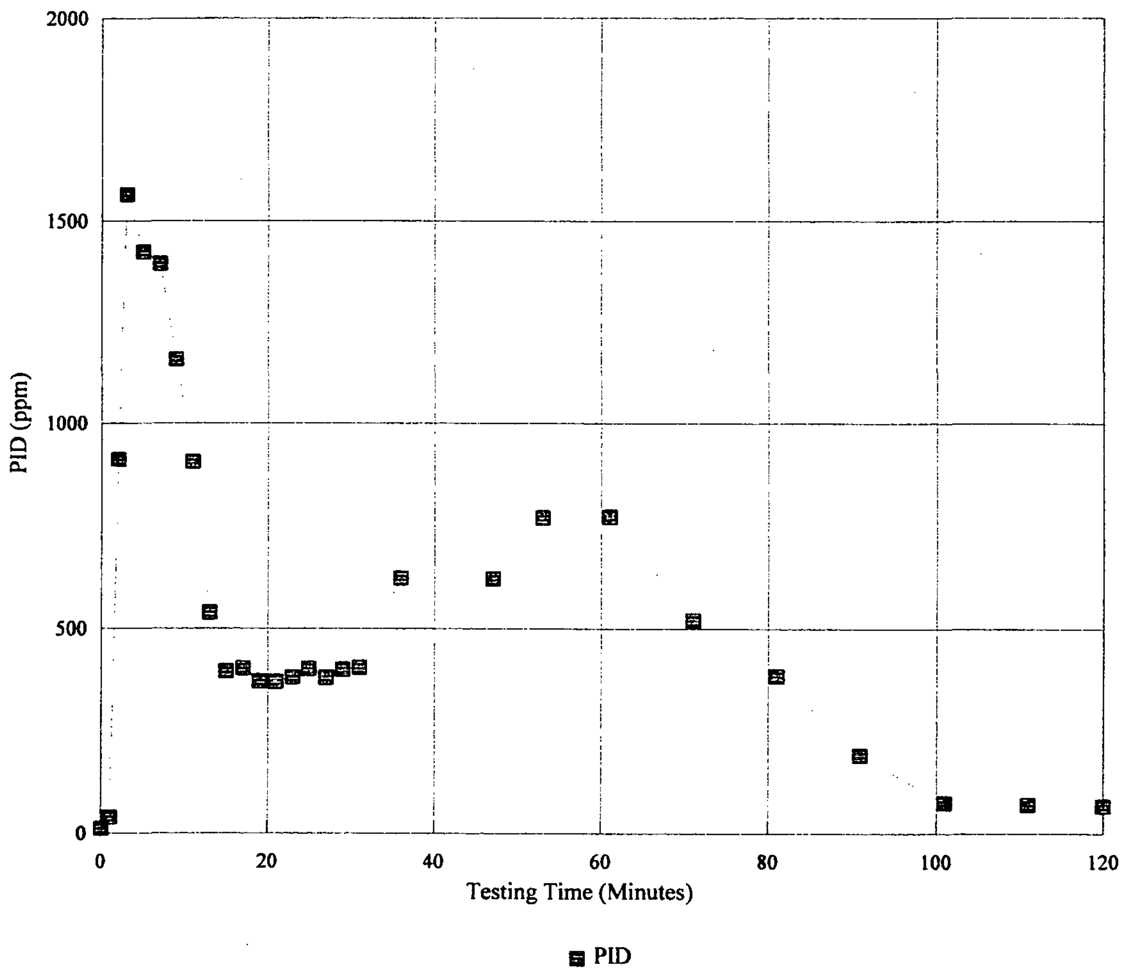
(1) All reagents will be blended dry, slurried with water and added to the untreated material and blended.
(2) For a mixture with 10% reagent addition and 10% water addition, 20 grams of reagent will be slurried with 20 grams of water and added to 200 grams of untreated material.
(3) Unconfined compressive strength testing was performed after 21 days of curing.
- Testing Not Performed

2964_212

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 8
Phase III: Intermediate Tests - Air Stripping
Summary of Glove Bag Setup and Monitoring
(Air Stripping)

UNTREATED MATERIAL TYPE	UNTREATED MASS (g)	AIR INFLOW (lpm)	AIR OUTFLOW (lpm)	AIR STRIPPING DURATION (min)	AIR STRIPPING FLOW RATE (lpm)	MAXIMUM PID (ppm.)
Untreated	1,500	3	3	120	5	1,566



KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 9

Phase III: Intermediate Tests - Air Stripping
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(Air Stripped Soil)

ANALYTICAL PARAMETER	RESULTS (ug/kg) (1) 0 Minutes		10 Minutes		30 Minutes		60 Minutes		120 Minutes	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES										
Acetone	-	2,000,000	77,000 J	1,900,000	67,000 J	1,900,000	-	1,900,000	-	1,900,000
Benzene	27,000 J	98,000	8,500 J	96,000	-	95,000	-	95,000	-	93,000
Bromobenzene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Bromochloromethane	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Bromodichloromethane	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Bromoform	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Bromomethane	-	200,000	-	190,000	-	190,000	-	190,000	-	190,000
2-butanone	190,000 J	2,000,000	86,000 J	1,900,000	48,000 J	1,900,000	-	1,900,000	-	1,900,000
n-Butylbenzene	33,000 J	98,000	26,000 J	96,000	23,000 J	95,000	21,000 J	1,900,000	16,000 J	93,000
s-Butylbenzene	7,700 J	98,000	-	96,000	-	95,000	-	95,000	-	93,000
t-Butlybenzene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Carbon disulfide	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Carbon tetrachloride	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Chlorobenzene	190,000	98,000	110,000	96,000	77,000 J	95,000	50,000 J	95,000	27,000 J	93,000
Chorodibromomethane	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Chloroethane	-	200,000	-	190,000	-	190,000	-	190,000	-	190,000
2-Chloroethyl vinyl ether	-	200,000	-	190,000	-	190,000	-	190,000	-	190,000
Chloroform	72,000 J	98,000	20,000 J	96,000	8,200 J	95,000	-	95,000	-	93,000
Chloromethane	-	200,000	-	190,000	-	190,000	-	190,000	-	190,000
2-Chlorotoluene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
4-Chlorotoluene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
1,2-Dibromo-3-Chloropropane	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
1,2-Dibromoethane	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Dibromomethane	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
1,2-Dichlorobenzene	190,000	98,000	130,000	96,000	120,000	95,000	110,000	95,000	81,000 J	93,000
1,3-Dichlorobenzene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
1,4-Dichlorobenzene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Dichlorodifluoromethane	-	200,000	-	190,000	-	190,000	-	190,000	-	190,000
1,1-Dichloroethane	66,000 J	98,000	12,000 J	96,000	-	95,000	-	95,000	-	93,000
1,2-Dichloroethane	59,000 J	98,000	18,000 J	96,000	8,900 J	95,000	-	95,000	-	93,000
1,1-Dichloroethene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
cis-1,2-Dichloroethene	25,000 J	98,000	5,500 J	96,000	-	95,000	-	95,000	-	93,000
trans-1,2-Dichloroethene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
1,2-Dichloropropane	9,100 J	98,000	-	96,000	-	95,000	-	95,000	-	93,000
1,3-Dichloropropane	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 9
Phase III: Intermediate Tests - Air Stripping
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(Air Stripped Soil)

ANALYTICAL PARAMETER	RESULTS (ug/kg) (1)									
	0 Minutes		10 Minutes		30 Minutes		60 Minutes		120 Minutes	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES										
2,2-Dichloropropane	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
cis-1,3-Dichloropropene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
trans-1,3-Dichloropropene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
1,1-Dichloropropene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Ethylbenzene	730,000	98,000	490,000	96,000	350,000	95,000	230,000	95,000	130,000	93,000
2-Hexanone	-	200,000	-	190,000	-	190,000	-	190,000	-	190,000
Hexachlorobutadiene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Isopropyl benzene	28,000 J	98,000	22,000 J	96,000	17,000 J	95,000	12,000 J	95,000	7,800 J	93,000
p-isopropyltoluene	13,000 J	98,000	7,500 J	96,000	6,700 J	95,000	5,900 J	95,000	-	93,000
4-Methyl-2-pentanone (MIBK)	250,000	200,000	130,000 J	190,000	77,000 J	190,000	38,000 J	190,000	-	190,000
Methylene chloride	55,000 J	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Naphthalene	58,000 J	200,000	46,000 J	190,000	45,000 J	190,000	44,000 J	190,000	36,000 J	190,000
n-Propyl benzene	77,000 J	98,000	60,000 J	96,000	48,000 J	95,000	38,000 J	95,000	25,000 J	93,000
Styrene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
1,1,1,2-Tetrachloroethane	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
1,1,2,2-Tetrachloroethane	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Tetrachloroethene	5,800,000	98,000	2,900,000	96,000	1,800,000	95,000	1,100,000	95,000	610,000	93,000
Toluene	5,900,000	98,000	2,400,000	96,000	1,400,000	95,000	740,000	95,000	370,000	93,000
1,2,3-Trichlorobenzene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
1,2,4-Trichlorobenzene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
1,1,1-Trichloroethane	700,000	98,000	230,000	96,000	89,000 J	95,000	38,000 J	95,000	16,000 J	93,000
1,1,2-Trichloroethane	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
Trichloroethene	8,000,000	98,000	2,600,000	96,000	1,200,000	95,000	560,000	95,000	260,000	93,000
Trichlorofluoromethane	-	200,000	-	190,000	-	190,000	-	190,000	-	190,000
1,2,3-Trichloropropane	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000
1,2,4-Trimethylbenzene	300,000	98,000	240,000	96,000	210,000	95,000	180,000	95,000	130,000	93,000
1,3,5-Trimethylbenzene	110,000	98,000	86,000 J	96,000	68,000 J	95,000	61,000 J	95,000	43,000 J	93,000
Vinyl Acetate	-	200,000	-	190,000	-	190,000	-	190,000	-	190,000
Vinyl Chloride	-	200,000	-	190,000	-	190,000	-	190,000	-	190,000
o-xylene	800,000	98,000	560,000	96,000	430,000	95,000	310,000	95,000	190,000	93,000
m-xylene	3,000,000	98,000	2,100,000	96,000	1,500,000	95,000	1,000,000	95,000	620,000	93,000
p-xylene	-	98,000	-	96,000	-	95,000	-	95,000	-	93,000

(1) The time interval indicates that the sample was taken after the specified amount of air stripping.
DL Detection Limit
J Estimated Value
\- Non Detectable concentrations

2964_215

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 10
Phase III: Intermediate Tests - Air Stripping
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(Carbon Cartridges)

ANALYTICAL PARAMETER	RESULTS (ug/kg) (1)					
	Carbon A		Carbon B		Carbon C	
	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES						
Acetone	-	31,000,000	-	71,000,000	-	71,000,000
Benzene	-	1,600,000	-	3,600,000	-	3,600,000
Bromobenzene	-	1,600,000	-	3,600,000	-	3,600,000
Bromochloromethane	-	1,600,000	-	3,600,000	-	3,600,000
Bromodichloromethane	-	1,600,000	-	3,600,000	-	3,600,000
Bromoform	-	1,600,000	-	3,600,000	-	3,600,000
Bromomethane	-	3,100,000	-	7,100,000	-	7,100,000
2-butanone	-	31,000,000	-	71,000,000	-	71,000,000
n-Butylbenzene	-	1,600,000	-	3,600,000	-	3,600,000
s-Butylbenzene	190,000 J	1,600,000	-	3,600,000	-	3,600,000
t-Butlybenzene	-	1,600,000	-	3,600,000	-	3,600,000
Carbon disulfide	-	1,600,000	-	3,600,000	-	3,600,000
Carbon tetrachloride	-	1,600,000	-	3,600,000	-	3,600,000
Chlorobenzene	1,500,000 J	1,600,000	-	3,600,000	-	3,600,000
Chorodibromomethane	-	1,600,000	-	3,600,000	-	3,600,000
Chloroethane	-	3,100,000	-	7,100,000	-	7,100,000
2-Chloroethyl vinyl ether	-	3,100,000	-	7,100,000	-	7,100,000
Chloroform	-	1,600,000	-	3,600,000	-	3,600,000
Chloromethane	-	3,100,000	-	7,100,000	-	7,100,000
2-Chlorotoluene	-	1,600,000	-	3,600,000	-	3,600,000
4-Chlorotoluene	-	1,600,000	-	3,600,000	-	3,600,000
1,2-Dibromo-3-Chloropropane	-	1,600,000	-	3,600,000	-	3,600,000
1,2-Dibromoethane	-	1,600,000	-	3,600,000	-	3,600,000
Dibromomethane	-	1,600,000	-	3,600,000	-	3,600,000
1,2-Dichlorobenzene	2,400,000	1,600,000	3,500,000 J	3,600,000	580,000 J	3,600,000
1,3-Dichlorobenzene	-	1,600,000	-	3,600,000	-	3,600,000
1,4-Dichlorobenzene	-	1,600,000	-	3,600,000	-	3,600,000
Dichlorodifluoromethane	-	3,100,000	-	7,100,000	-	7,100,000
1,1-Dichloroethane	-	1,600,000	-	3,600,000	-	3,600,000
1,2-Dichloroethane	-	1,600,000	-	3,600,000	-	3,600,000
1,1-Dichloroethene	-	1,600,000	-	3,600,000	-	3,600,000
cis-1,2-Dichloroethene	-	1,600,000	-	3,600,000	-	3,600,000
trans-1,2-Dichloroethene	-	1,600,000	-	3,600,000	-	3,600,000
1,2-Dichloropropane	-	1,600,000	-	3,600,000	-	3,600,000
1,3-Dichloropropane	-	1,600,000	-	3,600,000	-	3,600,000

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 10
Phase III: Intermediate Tests - Air Stripping
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(Carbon Cartridges)

ANALYTICAL PARAMETER	RESULTS (ug/kg) (1)					
	Carbon A		Carbon B		Carbon C	
	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES						
2,2-Dichloropropane	-	1,600,000	-	3,600,000	-	3,600,000
cis-1,3-Dichloropropene	-	1,600,000	-	3,600,000	-	3,600,000
trans-1,3-Dichloropropene	-	1,600,000	-	3,600,000	-	3,600,000
1,1-Dichloropropene	-	1,600,000	-	3,600,000	-	3,600,000
Ethylbenzene	7,300,000	1,600,000	7,300,000	3,600,000	12,000,000	3,600,000
2-Hexanone	-	3,100,000	-	7,100,000	-	7,100,000
Hexachlorobutadiene	-	1,600,000	-	3,600,000	-	3,600,000
Isopropyl benzene	490,000 J	1,600,000	460,000 J	3,600,000	810,000 J	3,600,000
p-isopropyltoluene	320,000 J	1,600,000	330,000 J	3,600,000	220,000 J	3,600,000
4-Methyl-2-pentanone (MIBK)	1,500,000 J	3,200,000	1,200,000 J	7,100,000	2,500,000 J	7,100,000
Methylene chloride	-	1,600,000	-	3,600,000	-	3,600,000
Naphthalene	-	3,200,000	-	7,100,000	-	7,100,000
n-Propyl benzene	1,600,000	1,600,000	1,700,000 J	3,600,000	2,500,000 J	3,600,000
Styrene	-	1,600,000	-	3,600,000	-	3,600,000
1,1,1,2-Tetrachloroethane	-	1,600,000	-	3,600,000	-	3,600,000
1,1,2,2-Tetrachloroethane	-	1,600,000	-	3,600,000	-	3,600,000
Tetrachloroethene	27,000,000	1,600,000	29,000,000	3,600,000	40,000,000	3,600,000
Toluene	18,000,000	1,600,000	19,000,000	3,600,000	27,000,000	3,600,000
1,2,3-Trichlorobenzene	-	1,600,000	-	3,600,000	-	3,600,000
1,2,4-Trichlorobenzene	-	1,600,000	-	3,600,000	-	3,600,000
1,1,1-Trichloroethane	380,000 J	1,600,000	400,000 J	3,600,000	530,000 J	3,600,000
1,1,2-Trichloroethane	-	1,600,000	-	3,600,000	-	3,600,000
Trichloroethene	7,900,000	1,600,000	8,800,000	3,600,000	11,000,000	3,600,000
Trichlorofluoromethane	-	3,100,000	-	7,100,000	-	7,100,000
1,2,3-Trichloropropane	-	1,600,000	-	3,600,000	-	3,600,000
1,2,4-Trimethylbenzene	6,300,000	1,600,000	8,400,000	3,600,000	2,800,000 J	3,600,000
1,3,5-Trimethylbenzene	2,600,000	1,600,000	3,300,000 J	3,600,000	2,700,000 J	3,600,000
Vinyl Acetate	-	3,200,000	-	7,100,000	-	7,100,000
Vinyl Chloride	-	3,200,000	-	7,100,000	-	7,100,000
o-xylene	13,000,000	1,600,000	15,000,000	3,600,000	21,000,000	3,600,000
m-xylene	39,000,000	1,600,000	43,000,000	3,600,000	65,000,000	3,600,000
p-xylene	-	1,600,000	-	3,600,000	-	3,600,000

(1) A, B and C represent the carbon cartridges in series. Carbon A was the carbon cartridge closest to the outside air, Carbon B represents the middle carbon and Carbon C was the carbon cartridge closest to the glovebag.

DL Detection Limit

J Estimated Value

\- Non Detectable concentrations

2964_214

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 11
Phase III: Intermediate Tests - Zero Valent Iron Amendment
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (ug/kg)							
	A Mixtures 013 & 017		B Mixtures 014 & 018		C Mixtures 015 & 019		D Mixtures 016 & 020	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES								
Acetone	86,000 J	200,000	670,000	190,000	130,000 J	2,000,000	190,000 J	2,000,000
Benzene	7,600 J	9,900	71,000	9,300	-	100,000	12,000 J	100,000
Bromobenzene	-	9,900	-	9,300	-	100,000	-	100,000
Bromochloromethane	-	9,900	-	9,300	-	100,000	-	100,000
Bromodichloromethane	-	9,900	-	9,300	-	100,000	-	100,000
Bromoform	-	9,900	-	9,300	-	100,000	-	100,000
Bromomethane	-	20,000	-	19,000	-	200,000	-	200,000
2-butanone	74,000 J	200,000	830,000	190,000	91,000 J	2,000,000	130,000 J	2,000,000
n-Butylbenzene	16,000	9,900	180,000	9,300	16,000 J	100,000	17,000 J	100,000
s-Butylbenzene	2,900 J	9,900	39,000	9,300	-	100,000	-	100,000
t-Butlybenzene	-	9,900	-	9,300	-	100,000	-	100,000
Carbon disulfide	-	9,900	-	9,300	-	100,000	-	100,000
Carbon tetrachloride	-	9,900	-	9,300	-	100,000	-	100,000
Chlorobenzene	75,000	9,900	93,000	9,300	71,000	100,000	85,000 J	100,000
Chorodibromomethane	-	9,900	-	9,300	-	100,000	-	100,000
Chloroethane	-	20,000	-	19,000	-	200,000	-	200,000
2-Chloroethyl vinyl ether	-	20,000	-	19,000	-	200,000	-	200,000
Chloroform	24,000	9,900	200,000	9,300	13,000 J	100,000	38,000 J	100,000
Chloromethane	-	20,000	-	19,000	-	200,000	-	200,000
2-Chlorotoluene	-	9,900	4,400 J	9,300	-	100,000	-	100,000
4-Chlorotoluene	-	9,900	3,700 J	9,300	-	100,000	-	100,000
1,2-Dibromo-3-Chloropropane	-	9,900	-	9,300	-	100,000	-	100,000
1,2-Dibromoethane	-	9,900	-	9,300	-	100,000	-	100,000
Dibromomethane	-	9,900	-	9,300	-	100,000	-	100,000
1,2-Dichlorobenzene	82,000	9,900	110,000	9,300	84,000 J	100,000	88,000 J	100,000
1,3-Dichlorobenzene	-	9,900	3,000 J	9,300	-	100,000	-	100,000
1,4-Dichlorobenzene	2,100 J	9,900	21,000	9,300	-	100,000	-	100,000
Dichlorodifluoromethane	-	20,000	-	19,000	-	200,000	-	200,000
1,1-Dichloroethane	12,000	9,900	140,000	9,300	7,100 J	100,000	36,000 J	100,000
1,2-Dichloroethane	27,000	9,900	250,000	9,300	22,000 J	100,000	43,000 J	100,000
1,1-Dichloroethene	-	9,900	3,500 J	9,300	-	100,000	-	100,000
cis-1,2-Dichloroethene	6,100 J	9,900	62,000	9,300	-	100,000	14,000 J	100,000
trans-1,2-Dichloroethene	-	9,900	890 J	9,300	-	100,000	-	100,000
1,2-Dichloropropane	4,000 J	9,900	26,000	9,300	-	100,000	-	100,000
1,3-Dichloropropane	-	9,900	-	9,300	-	100,000	-	100,000

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 11
Phase III: Intermediate Tests - Zero Valent Iron Amendment
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (ug/kg) A Mixtures 013 & 017 Conc.	A DL	B Mixtures 014 & 018 Conc.	B DL	C Mixtures 015 & 019 Conc.	C DL	D Mixtures 016 & 020 Conc.	D DL
I. TOTAL VOLATILES								
2,2-Dichloropropane	-	9,900	-	9,300	-	100,000	-	100,000
cis-1,3-Dichloropropene	-	9,900	-	9,300	-	100,000	-	100,000
trans-1,3-Dichloropropene	-	9,900	-	9,300	-	100,000	-	100,000
1,1-Dichloropropene	-	9,900	-	9,300	-	100,000	-	100,000
Ethylbenzene	280,000	9,900	290,000	93,000	210,000	100,000	260,000	100,000
2-Hexanone	-	20,000	-	19,000	-	200,000	-	200,000
Hexachlorobutadiene	-	9,900	-	9,300	-	100,000	-	100,000
Isopropyl benzene	13,000	9,900	120,000	9,300	6,600 J	100,000	7,300 J	100,000
p-isopropyltoluene	3,600 J	9,900	47,000	9,300	-	100,000	-	100,000
4-Methyl-2-pentanone (MIBK)	81,000	20,000	120,000	190,000	-	200,000	130,000 J	200,000
Methylene chloride	15,000	9,900	160,000	9,300	-	100,000	46,000 J	100,000
Naphthalene	15,000 J	20,000	120,000	19,000	28,000 J	200,000	33,000 J	200,000
n-Propyl benzene	35,000	9,900	260,000	9,300	21,000 J	100,000	23,000 J	100,000
Styrene	-	9,900	-	9,300	-	100,000	-	100,000
1,1,1,2-Tetrachloroethane	-	9,900	-	9,300	-	100,000	-	100,000
1,1,2,2-Tetrachloroethane	-	9,900	-	9,300	-	100,000	-	100,000
Tetrachloroethene	700,000	9,900	1,600,000	93,000	1,300,000	100,000	1,600,000	100,000
Toluene	750,000	9,900	1,700,000	93,000	1,300,000	100,000	1,800,000	100,000
1,2,3-Trichlorobenzene	-	9,900	1,500 J	9,300	-	100,000	-	100,000
1,2,4-Trichlorobenzene	1,300 J	9,900	12,000	9,300	-	100,000	-	100,000
1,1,1-Trichloroethane	170,000	9,900	200,000	9,300	130,000	100,000	310,000	100,000
1,1,2-Trichloroethane	4,500 J	9,900	32,000	9,300	-	100,000	-	100,000
Trichloroethene	740,000	5,000	1,700,000	93,000	1,300,000	100,000	2,100,000	100,000
Trichlorofluoromethane	-	20,000	-	19,000	-	200,000	-	200,000
1,2,3-Trichloropropane	-	9,900	-	9,300	-	100,000	-	100,000
1,2,4-Trimethylbenzene	130,000	9,900	130,000	93,000	99,000 J	100,000	110,000	100,000
1,3,5-Trimethylbenzene	43,000	9,900	270,000	9,300	29,000 J	100,000	36,000 J	100,000
Vinyl Acetate	-	20,000	-	19,000	-	200,000	-	200,000
Vinyl Chloride	-	20,000	-	19,000	-	200,000	-	200,000
o-xylene	310,000	9,900	320,000	93,000	220,000	100,000	270,000	100,000
m-xylene	500,000	9,900	1,200,000	93,000	870,000	100,000	1,000,000	100,000
p-xylene	-	9,900	-	9,300	-	100,000	-	100,000

DL Detection Limit
J Estimated Value
\- Non Detectable concentrations

2964_216

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 12
Phase III: Intermediate Tests - Zero Valent Iron Amendment
Summary of SPLP Volatile Organic Analyses - EPA Methods 1312/8260B
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (ug/L)							
	A		B		C		D	
	Mixtures 013 & 017		Mixtures 014 & 018		Mixtures 015 & 019		Mixtures 016 & 020	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. SPLP VOLATILES								
Acetone	4,200 J	10,000	5,100 J	10,000	5,900 J	10,000	5,600 J	10,000
Benzene	540	500	610	500	640	500	640	500
Bromobenzene	-	500	-	500	-	500	-	500
Bromochloromethane	-	500	-	500	-	500	-	500
Bromodichloromethane	-	500	-	500	-	500	-	500
Bromoform	-	500	-	500	-	500	-	500
Bromomethane	-	1,000	-	1,000	-	1,000	-	1,000
2-butanone	3,600 J	10,000	4,600 J	10,000	4,900 J	10,000	4,800 J	10,000
n-Butylbenzene	-	500	-	500	-	500	-	500
s-Butylbenzene	-	500	-	500	-	500	-	500
t-Butlybenzene	-	500	-	500	-	500	-	500
Carbon disulfide	-	500	-	500	-	500	-	500
Carbon tetrachloride	-	500	-	500	-	500	-	500
Chlorobenzene	1,400	500	1,500	500	1,600	500	1,400	500
Chorodibromomethane	-	500	-	500	-	500	-	500
Chloroethane	-	1,000	-	1,000	-	1,000	-	1,000
2-Chloroethyl vinyl ether	-	1,000	-	1,000	-	1,000	-	1,000
Chloroform	2,300	500	2,600	500	2,500	500	2,700	500
Chloromethane	-	1,000	-	1,000	-	1,000	-	1,000
2-Chlorotoluene	-	500	-	500	-	500	-	500
4-Chlorotoluene	-	500	-	500	-	500	-	500
1,2-Dibromo-3-Chloropropane	-	500	-	500	-	500	-	500
1,2-Dibromoethane	-	500	-	500	-	500	-	500
Dibromomethane	-	500	-	500	-	500	-	500
1,2-Dichlorobenzene	460 J	500	520	500	530	500	470 J	500
1,3-Dichlorobenzene	-	500	-	500	-	500	-	500
1,4-Dichlorobenzene	-	500	-	500	-	500	-	500
Dichlorodifluoromethane	-	1,000	-	1,000	-	1,000	-	1,000
1,1-Dichloroethane	1,800	500	2,300	500	2,400	500	2,800	500
1,2-Dichloroethane	2,400	500	3,100	500	3,200	500	3,100	500
1,1-Dichloroethene	-	500	48 J	500	47 J	500	58 J	500
cis-1,2-Dichloroethene	640	500	750	500	820	500	910	500
trans-1,2-Dichloroethene	-	500	-	500	-	500	-	500
1,2-Dichloropropane	240 J	500	250 J	500	240 J	500	230 J	500
1,3-Dichloropropane	-	500	-	500	-	500	-	500

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 12
Phase III: Intermediate Tests - Zero Valent Iron Amendment
Summary of SPLP Volatile Organic Analyses - EPA Methods 1312/8260B
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (ug/L)							
	A Mixtures 013 & 017		B Mixtures 014 & 018		C Mixtures 015 & 019		D Mixtures 016 & 020	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. SPLP VOLATILES								
2,2-Dichloropropane	-	500	-	500	-	500	-	500
cis-1,3-Dichloropropene	-	500	-	500	-	500	-	500
trans-1,3-Dichloropropene	-	500	-	500	-	500	-	500
1,1-Dichloropropene	-	500	-	500	-	500	-	500
Ethylbenzene	2,900	500	2,800	500	2,800	500	2,700	500
2-Hexanone	-	1,000	-	1,000	-	1,000	-	1,000
Hexachlorobutadiene	-	500	-	500	-	500	-	500
Isopropyl benzene	41 J	500	39 J	500	38 J	500	35 J	500
p-isopropyltoluene	-	500	-	500	-	500	-	500
4-Methyl-2-pentanone (MIBK)	5,200	1,000	6,700	1,000	7,100	1,000	6,800	1,000
Methylene chloride	2,700	500	3,300	500	3,300	500	3,900	500
Naphthalene	100 J	1,000	100 J	1,000	97 J	1,000	90 J	1,000
n-Propyl benzene	90 J	500	86 J	500	82 J	500	76 J	500
Styrene	-	500	-	500	-	500	-	500
1,1,1,2-Tetrachloroethane	-	500	-	500	-	500	-	500
1,1,2,2-Tetrachloroethane	-	500	-	500	-	500	-	500
Tetrachloroethene	13,000	500	13,000	500	12,000	500	11,000	500
Toluene	41,000	5,000	48,000	5,000	42,000	5,000	45,000	5,000
1,2,3-Trichlorobenzene	-	500	-	500	-	500	-	500
1,2,4-Trichlorobenzene	-	500	-	500	-	500	-	500
1,1,1-Trichloroethane	10,000	500	12,000	500	12,000	500	12,000	500
1,1,2-Trichloroethane	210 J	500	210 J	500	180 J	500	160 J	500
Trichloroethene	62,000	5,000	78,000	5,000	67,000	5,000	75,000	5,000
Trichlorofluoromethane	-	1,000	-	1,000	-	1,000	-	1,000
1,2,3-Trichloropropane	-	500	-	500	-	500	-	500
1,2,4-Trimethylbenzene	470 J	500	440 J	500	420 J	500	390 J	500
1,3,5-Trimethylbenzene	140 J	500	130 J	500	120 J	500	120 J	500
Vinyl Acetate	-	1,000	-	1,000	-	1,000	-	1,000
Vinyl Chloride	-	1,000	88 J	1,000	65 J	1,000	150 J	1,000
o-xylene	3,300	500	3,200	500	3,200	500	3,000	500
m-xylene	9,800	500	9,400	500	9,700	500	9,000	500
p-xylene	-	500	-	500	-	500	-	500

DL Detection Limit
J Estimated Value
\- Non Detectable concentrations

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KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 13
Phase III: Intermediate Tests - Zero Valent Iron Amendment
Summary of Total PCB and Chloride Analyses - EPA Methods 8082/325.2
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (ug/kg) (1)							
	A Mixtures 013 & 017		B Mixtures 014 & 018		C Mixtures 015 & 019		D Mixtures 016 & 020	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL PCBs								
Aroclor-1016	-	26,000	-	25,000	-	27,000	-	27,000
Aroclor-1221	-	26,000	-	25,000	-	27,000	-	27,000
Aroclor-1232	-	26,000	-	25,000	-	27,000	-	27,000
Aroclor-1242	430,000	26,000	410,000	25,000	500,000	27,000	340,000	27,000
Aroclor-1248	-	26,000	-	25,000	-	27,000	-	27,000
Aroclor-1254	-	26,000	-	25,000	-	27,000	-	27,000
Aroclor-1260	-	26,000	-	25,000	-	27,000	-	27,000
II. ADDITIONAL PARAMETERS								
Chloride (mg/kg)	40,000	13,000	25,000	12,000	29,000	13,000	14,000	13,000

DL Detection Limit
J Estimated Value
\- Non Detectable Concentrations

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KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 14
Phase III: Intermediate Tests - Zero Valent Iron Amendment
Summary of SPLP PCB and Chloride Analyses - EPA Methods 1312/8082
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (ug/L)							
	A Mixtures 013 & 017		B Mixtures 014 & 018		C Mixtures 015 & 019		D Mixtures 016 & 020	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. SPLP PCBs								
Aroclor-1016	-	0.50	-	0.50	-	0.50	-	0.50
Aroclor-1221	-	0.50	-	0.50	-	0.50	-	0.50
Aroclor-1232	-	0.50	-	0.50	-	0.50	-	0.50
Aroclor-1242	98	0.50	190	0.50	100	0.50	140	0.50
Aroclor-1248	-	0.50	-	0.50	-	0.50	-	0.50
Aroclor-1254	-	0.50	-	0.50	-	0.50	-	0.50
Aroclor-1260	-	0.50	-	0.50	-	0.50	-	0.50

DL Detection Limit
- Non Detectable Concentrations

2964_219

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 15
Phase III: Intermediate Tests - Zero Valent Iron Amendment
Summary of Mixture Development

KIBER SAMPLE No.	MATERIAL TYPE	REAGENT TYPE	REAGENT ADDITION (%) (2)	WATER ADDITION (%) (2)
	REAGENT ONLY (1)			
2964-013	Parent A	Type I Portland Cement	10	8
2964-014	Parent B	Type I Portland Cement / Organophillic Clay	20 / 3	16
2964-015	Parent C	Type I Portland Cement / Organophillic Clay	20 / 5	25
2964-016	Parent D	Type I Portland Cement / Hydrated Lime	10 / 10	20
	REAGENT WITH IRON ADDITION (2)			
2964-017	Parent A	Type I Portland Cement	10	8
2964-018	Parent B	Type I Portland Cement / Organophillic Clay	20 / 3	16
2964-019	Parent C	Type I Portland Cement / Organophillic Clay	20 / 5	25
2964-020	Parent D	Type I Portland Cement / Organophillic Clay	10 / 10	20

(1) Reagents were blended dry, slurried with water and added to the untreated material and blended. Note that these mixtures were blended in a similar manner to those that received iron addition and were allowed to set for 3 days. After three days the treatment reagents were added.
(2) Iron was added to the untreated aliquot and blended until homogenous. The material was allowed to sit for a period of 3 days at which time treatment reagents were blended dry, slurried with water and added to the untreated material and blended.
(3) For a mixture with 10% reagent addition and 10% water addition, 20 grams of reagent will be slurried with 20 grams of water and added to 200 grams of untreated material.

2964_243

400134

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 16

Phase III: Intermediate Tests - Zero Valent Iron Amendment
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(21 Day Cure)

ANALYTICAL PARAMETER	RESULTS (ug/kg)							
	10% Cement		20% Cement / 3 % Clay		20% Cement / 5 % Clay		10% Cement / 10 % Lime	
	2964-013 Reagent	2964-017 Iron Filing	2964-014 Reagent	2964-018 Iron Filing	2964-015 Reagent	2964-019 Iron Filing	2964-016 Reagent	2964-020 Iron Filing
I. TOTAL VOLATILES								
Acetone	**20,000 J**	**11,000 J**	**13,000 J**	**8,700 J**	**14,000 J**	**11,000 J**	**13,000 J**	**11,000 J**
Benzene	**6,300 J**	**3,800 J**	**6,500 J**	**3,300 J**	**7,500 J**	**4,300 J**	**4,000 J**	**2,100 J**
Bromobenzene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
Bromochloromethane	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
Bromodichloromethane	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
Bromoform	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
Bromomethane	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
2-butanone	**16,000 J**	**9,300 J**	**12,000 J**	**7,300 J**	**13,000 J**	**9,000 J**	**8,600 J**	**6,400 J**
n-Butylbenzene	**23,000**	**19,000**	**24,000**	**18,000**	**21,000**	**18,000**	**21,000**	**18,000**
s-Butylbenzene	**4,500 J**	**3,800 J**	**4,700 J**	**3,500 J**	**4,100 J**	**3,400 J**	**4,100 J**	**3,300 J**
t-Butlybenzene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
Carbon disulfide	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
Carbon tetrachloride	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
Chlorobenzene	**74,000**	**59,000**	**84,000**	**62,000**	**86,000**	**69,000**	**69,000**	**55,000**
Chorodibromomethane	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
Chloroethane	< 16,000	< 16,000	< 16,000	< 16,000	< 17,000	< 16,000	< 16,000	< 16,000
2-Chloroethyl vinyl ether	< 16,000	< 16,000	< 16,000	< 16,000	< 17,000	< 16,000	< 16,000	< 16,000
Chloroform	**13,000**	**6,900 J**	**13,000**	**5,900 J**	**15,000**	**7,300 J**	**5,400 J**	**2,300 J**
Chloromethane	< 16,000	< 16,000	< 16,000	< 16,000	< 17,000	< 16,000	< 16,000	< 16,000
2-Chlorotoluene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
4-Chlorotoluene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
1,2-Dibromo-3-Chloropropane	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
1,2-Dibromoethane	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
Dibromomethane	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
1,2-Dichlorobenzene	**110,000**	**91,000**	**130,000**	**97,000**	**130,000**	**110,000**	**120,000**	**96,000**
1,3-Dichlorobenzene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
1,4-Dichlorobenzene	**2,600 J**	**2,400 J**	**3,200 J**	**2,600 J**	**3,100 J**	**2,800 J**	**2,700 J**	**2,500 J**
Dichlorodifluoromethane	< 16,000	< 16,000	< 16,000	< 16,000	< 17,000	< 16,000	< 16,000	< 16,000
1,1-Dichloroethane	**6,600 J**	**3,400 J**	**7,300 J**	**2,700 J**	**10,000**	**4,500 J**	**3,600 J**	**1,000 J**
1,2-Dichloroethane	**10,000**	**4,800 J**	**9,200**	**4,600 J**	**11,000**	**5,900 J**	**4,400 J**	**2,500 J**
1,1-Dichloroethene	**470 J**	< 7,800	< 8,200	< 7,900	**870 J**	< 8,200	< 8,000	< 8,200
cis-1,2-Dichloroethene	**3,200 J**	**1,800 J**	**3,600 J**	**1,600 J**	**4,700 J**	**2,400 J**	**1,600 J**	**590 J**
trans-1,2-Dichloroethene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
1,2-Dichloropropane	**3,500 J**	**2,300 J**	**3,100 J**	**1,900 J**	**3,100 J**	**2,000 J**	**1,900 J**	**1,100 J**
1,3-Dichloropropane	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 16
Phase III: Intermediate Tests - Zero Valent Iron Amendment
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(21 Day Cure)

ANALYTICAL PARAMETER	RESULTS (ug/kg)							
	10% Cement		20% Cement / 3 % Clay		20% Cement / 5 % Clay		10% Cement / 10 % Lime	
	2964-013 Reagent	2964-017 Iron Filing	2964-014 Reagent	2964-018 Iron Filing	2964-015 Reagent	2964-019 Iron Filing	2964-016 Reagent	2964-020 Iron Filing
I. TOTAL VOLATILES								
2,2-Dichloropropane	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
cis-1,3-Dichloropropene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
trans-1,3-Dichloropropene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
1,1-Dichloropropene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
Ethylbenzene	**320,000**	**270,000**	**410,000**	**260,000**	**320,000**	**270,000**	**290,000**	**240,000**
2-Hexanone	< 16,000	< 16,000	< 16,000	< 16,000	< 17,000	< 16,000	< 16,000	< 16,000
Hexachlorobutadiene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
Isopropyl benzene	**15,000**	**12,000**	**15,000**	**11,000**	**14,000**	**11,000**	**13,000**	**10,000**
p-isopropyltoluene	**5,500 J**	**4,800 J**	**5,700 J**	**4,400 J**	**5,000 J**	**4,400 J**	**5,100 J**	**4,300 J**
4-Methyl-2-pentanone (MIBK)	**76,000**	**44,000**	**63,000**	**43,000**	**66,000**	**46,000**	**46,000**	**37,000**
Methylene chloride	**1,800 J**	< 7,800	**1,800 J**	< 7,900	**2,500 J**	< 8,200	< 8,000	< 8,200
Naphthalene	**41,000**	**32,000**	**38,000**	**28,000**	**36,000**	**27,000**	**36,000**	**28,000**
n-Propyl benzene	**48,000**	**38,000**	**49,000**	**36,000**	**43,000**	**36,000**	**41,000**	**34,000**
Styrene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
1,1,1,2-Tetrachloroethane	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
1,1,2,2-Tetrachloroethane	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
Tetrachloroethene	**2,000,000**	**1,400,000**	**2,200,000**	**1,700,000**	**1,800,000**	**1,600,000**	**1,600,000**	**1,400,000**
Toluene	**1,600,000**	**1,000,000**	**1,800,000**	**1,400,000**	**1,600,000**	**1,400,000**	**1,300,000**	**1,100,000**
1,2,3-Trichlorobenzene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
1,2,4-Trichlorobenzene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
1,1,1-Trichloroethane	**170,000**	**110,000**	**190,000**	**100,000**	**220,000**	**120,000**	**120,000**	**57,000**
1,1,2-Trichloroethane	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
Trichloroethene	**1,700,000**	**790,000**	**1,900,000**	**1,200,000**	**1,800,000**	**1,300,000**	**1,100,000**	**860,000**
Trichlorofluoromethane	< 16,000	< 16,000	< 16,000	< 16,000	< 17,000	< 16,000	< 16,000	< 16,000
1,2,3-Trichloropropane	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200
1,2,4-Trimethylbenzene	**180,000**	**150,000**	**180,000**	**140,000**	**170,000**	**140,000**	**170,000**	**140,000**
1,3,5-Trimethylbenzene	**63,000**	**51,000**	**64,000**	**47,000**	**56,000**	**46,000**	**55,000**	**47,000**
Vinyl Acetate	< 16,000	< 16,000	< 16,000	< 16,000	< 17,000	< 16,000	< 16,000	< 16,000
Vinyl Chloride	< 16,000	< 16,000	< 16,000	< 16,000	< 17,000	< 16,000	< 16,000	< 16,000
o-xylene	**400,000**	**310,000**	**450,000**	**370,000**	**380,000**	**350,000**	**370,000**	**320,000**
m-xylene	**1,400,000**	**1,100,000**	**1,600,000**	**1,300,000**	**1,300,000**	**1,200,000**	**1,300,000**	**1,100,000**
p-xylene	< 8,200	< 7,800	< 8,200	< 7,900	< 8,400	< 8,200	< 8,000	< 8,200

DL Detection Limit
J Estimated Value
\- Non Detectable concentrations

2964_221

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 17
Phase III: Intermediate Tests - Zero Valent Iron Amendment
Summary of SPLP Volatile Organic Analyses - EPA Methods 1312/8260B
(21 Day Cure)

ANALYTICAL PARAMETER	RESULTS (ug/L)							
	10% Cement		20% Cement / 3 % Clay		20% Cement / 5 % Clay		10% Cement / 10 % Lime	
	2964-013 Reagent	2964-017 Iron Filing	2964-014 Reagent	2964-018 Iron Filing	2964-015 Reagent	2964-019 Iron Filing	2964-016 Reagent	2964-020 Iron Filing
I. SPLP VOLATILES								
Acetone	**490 J**	**680 J**	**820 J**	**590 J**	**810 J**	**744 J**	**700 J**	< 500
Benzene	**91 J**	**85 J**	**160 J**	**86 J**	**150 J**	**103 J**	**120 J**	**41 J**
Bromobenzene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Bromochloromethane	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Bromodichloromethane	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Bromoform	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Bromomethane	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
2-butanone	**280 J**	**250 J**	**490 J**	**310 J**	**380 J**	**319 J**	**340 J**	**260 J**
n-Butylbenzene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
s-Butylbenzene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
t-Butlybenzene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Carbon disulfide	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Carbon tetrachloride	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Chlorobenzene	**950**	**890**	**1,100**	**960**	**1,100**	**937**	**1,100**	**910**
Chorodibromomethane	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Chloroethane	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
2-Chloroethyl vinyl ether	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Chloroform	**220 J**	**200 J**	**440 J**	**190 J**	**390 J**	**220 J**	**220 J**	**44 J**
Chloromethane	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
2-Chlorotoluene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
4-Chlorotoluene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
1,2-Dibromo-3-Chloropropane	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
1,2-Dibromoethane	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Dibromomethane	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
1,2-Dichlorobenzene	**450 J**	**430 J**	**410 J**	**380 J**	**390 J**	**356 J**	**510**	**530 J**
1,3-Dichlorobenzene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
1,4-Dichlorobenzene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Dichlorodifluoromethane	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
1,1-Dichloroethane	**75 J**	**83 J**	**240 J**	**77 J**	**240 J**	**118 J**	**150 J**	< 500
1,2-Dichloroethane	**220 J**	**190 J**	**420 J**	**210 J**	**400 J**	**265 J**	**220 J**	**72 J**
1,1-Dichloroethene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
cis-1,2-Dichloroethene	**32 J**	**39 J**	**92 J**	**41 J**	**100 J**	**56.1 J**	**51 J**	< 500
trans-1,2-Dichloroethene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
1,2-Dichloropropane	**67 J**	**57 J**	**87 J**	**54 J**	**71 J**	**50.2 J**	**58 J**	**26 J**
1,3-Dichloropropane	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 17
Phase III: Intermediate Tests - Zero Valent Iron Amendment
Summary of SPLP Volatile Organic Analyses - EPA Methods 1312/8260B
(21 Day Cure)

ANALYTICAL PARAMETER	RESULTS (ug/L)							
	10% Cement		20% Cement / 3 % Clay		20% Cement / 5 % Clay		10% Cement / 10 % Lime	
	2964-013 Reagent	2964-017 Iron Filing	2964-014 Reagent	2964-018 Iron Filing	2964-015 Reagent	2964-019 Iron Filing	2964-016 Reagent	2964-020 Iron Filing
I. SPLP VOLATILES								
2,2-Dichloropropane	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
cis-1,3-Dichloropropene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
trans-1,3-Dichloropropene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
1,1-Dichloropropene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Ethylbenzene	**2,300**	**2,100**	**2,400**	**2,200**	**2,300**	**2,260**	**2,500**	**2,100**
2-Hexanone	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Hexachlorobutadiene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Isopropyl benzene	**38 J**	**32 J**	**37 J**	**31 J**	**33 J**	**34.6 J**	**38 J**	**38 J**
p-isopropyltoluene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
4-Methyl-2-pentanone (MIBK)	**1,700**	**1,500**	**2,600**	**1,800**	**2,300**	**1,610**	**1,700**	**1,100**
Methylene chloride	< 500	< 500	**61 J**	< 500	< 500	< 500	< 500	< 500
Naphthalene	**140 J**	**110 J**	**91 J**	**80 J**	**77 J**	**71.4 J**	**110 J**	**140 J**
n-Propyl benzene	**84 J**	**71 J**	**81 J**	**64 J**	**69 J**	**73.1 J**	**80 J**	**81 J**
Styrene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
1,1,1,2-Tetrachloroethane	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
1,1,2,2-Tetrachloroethane	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Tetrachloroethene	**9,600**	**8,700**	**11,000**	**8,900**	**9,200**	**9,270**	**9,900**	**7,800**
Toluene	**19,000**	**17,000**	**31,000**	**18,000**	**27,000**	**18,600**	**29,000**	**14,000**
1,2,3-Trichlorobenzene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
1,2,4-Trichlorobenzene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
1,1,1-Trichloroethane	**2,100**	**1,900**	**4,000**	**2,000**	**3,800**	**2,440**	**3,100**	**800**
1,1,2-Trichloroethane	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
Trichloroethene	**19,000**	**17,000**	**35,000**	**18,000**	**32,000**	**23,900**	**30,000**	**11,000**
Trichlorofluoromethane	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
1,2,3-Trichloropropane	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500
1,2,4-Trimethylbenzene	**450 J**	**430 J**	**430 J**	**380 J**	**390 J**	**400 J**	**440 J**	**450 J**
1,3,5-Trimethylbenzene	**130 J**	**120 J**	**120 J**	**110 J**	**110 J**	**122 J**	**120 J**	**130 J**
Vinyl Acetate	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Vinyl Chloride	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
o-xylene	**2,900**	**2,700**	**2,900**	**2,700**	**2,800**	**2,720**	**3,000**	**2,700**
m-xylene	**8,400**	**7,900**	**8,800**	**8,000**	**8,300**	**8,190**	**9,000**	**7,900**
p-xylene	< 500	< 500	< 500	< 500	< 500	< 500	< 500	< 500

DL Detection Limit
J Estimated Value
\- Non Detectable concentrations

2964_222

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 18
Phase III: Intermediate Tests - Zero Valent Iron Addition
Summary of Total PCB and Chloride Analyses - EPA Methods 8082/325.2
(21 Day Cure)

ANALYTICAL PARAMETER	RESULTS (ug/kg) (1)							
	10% Cement		20% Cement / 3 % Clay		20% Cement / 5 % Clay		10% Cement / 10 % Lime	
	2964-013 Reagent	2964-017 Iron Filing	2964-014 Reagent	2964-018 Iron Filing	2964-015 Reagent	2964-019 Iron Filing	2964-016 Reagent	2964-020 Iron Filing
I. TOTAL PCBs								
Aroclor-1016	< 43,000	< 41,000	< 43,000	< 42,000	< 45,000	< 42,000	< 46,000	< 43,000
Aroclor-1221	< 43,000	< 41,000	< 43,000	< 42,000	< 45,000	< 42,000	< 46,000	< 43,000
Aroclor-1232	< 43,000	< 41,000	< 43,000	< 42,000	< 45,000	< 42,000	< 46,000	< 43,000
Aroclor-1242	**440,000**	**350,000**	**560,000**	**450,000**	**430,000**	**460,000**	**520,000**	**540,000**
Aroclor-1248	< 43,000	< 41,000	< 43,000	< 42,000	< 45,000	< 42,000	< 46,000	< 43,000
Aroclor-1254	< 43,000	< 41,000	< 43,000	< 42,000	< 45,000	< 42,000	< 46,000	< 43,000
Aroclor-1260	< 43,000	< 41,000	< 43,000	< 42,000	< 45,000	< 42,000	< 46,000	< 43,000
II. ADDITIONAL PARAMETERS								
Chloride (mg/kg)	**5,400**	**3,400**	**4,700**	**3,900**	**7,100**	**4,700**	**7,100**	**7,000**

DL Detection Limit
\- Non Detectable Concentrations

2964_223

400139

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 19
Phase III: Intermediate Tests - Zero Valent Iron Amendment
Summary of SPLP PCB Analyses - EPA Methods1312/8082
(21 Day Cure)

ANALYTICAL PARAMETER	RESULTS (ug/L) (1)							
	10% Cement		20% Cement / 3 % Clay		20% Cement / 5 % Clay		10% Cement / 10 % Lime	
	2964-013 Reagent	2964-017 Iron Filing	2964-014 Reagent	2964-018 Iron Filing	2964-015 Reagent	2964-019 Iron Filing	2964-016 Reagent	2964-020 Iron Filing
I. SPLP PCBs								
Aroclor-1016	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aroclor-1221	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aroclor-1232	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aroclor-1242	**15**	**2.2**	**19**	**0.97**	**4.9**	**2.4**	**2.7**	**2.1**
Aroclor-1248	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aroclor-1254	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aroclor-1260	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

DL Detection Limit
\- Non Detectable Concentrations

2964_224

400140

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 20

Phase III: Intermediate Tests - Zero Valent Iron Amendment

Summary of Unconfined Compressive Strength Testing - ASTM D 2166

(21 Day Cure)

KIBER SAMPLE No.	MATERIAL TYPE	REAGENT TYPE	REAGENT ADDITION (%) (3)	WATER ADDITION (%) (3)	UNCONFINED COMPRESSIVE STRENGTH TESTING (UCS) (4) Moisture Content (%)	Bulk Density (lbs/ft²)	Dry Density (lbs/ft²)	UCS (lbs/in²)
REAGEANT ADDITION ONLY (1)								
2964-013	Parent A	Type I Portland Cement	10	8	28	101	79	27
2964-014	Parent B	Type I Portland Cement / Organophillic Clay	20 / 3	16	28	99	78	32
2964-015	Parent C	Type I Portland Cement / Organophillic Clay	20 / 5	25	48	95	64	23
2964-016	Parent D	Type I Portland Cement / Hydrated Lime	10 / 10	20	42	96	98	39
IRON FILING ADDITION (2)								
2964-017	Parent A	Type I Portland Cement	10	8	29	104	81	38
2964-018	Parent B	Type I Portland Cement / Organophillic Clay	20 / 3	16	25	105	84	49
2964-019	Parent C	Type I Portland Cement / Organophillic Clay	20 / 5	25	29	104	80	38
2964-020	Parent D	Type I Portland Cement / Hydrated Lime	10 / 10	20	35	98	73	38

(1) Reagents were blended dry, slurried with water and added to the untreated material and blended. Note that these mixtures were blended in a similar manner to those that received iron addition and were allowed to set for 3 days. After three days the treatment reagents were added.
(2) Iron was added to the untreated aliquot and blended until homogenous. The material was allowed to sit for a period of 3 days at which time treatment reagents were blended dry, slurried with water and added to the untreated material and blended.
(3) For a mixture with 10% reagent addition and 10% water addition, 20 grams of reagent will be slurried with 20 grams of water and added to 200 grams of untreated material.
(4) Unconfined compressive strength testing was performed after 21 days of curing.

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KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 21
Phase IV: Verification Testing
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (ug/kg)			
	A		B	
	Mixtures 021 & 023		Mixtures 022 & 024	
	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES				
Acetone	140,000 J	1,500,000	-	16,000,000
Benzene	27,000 J	77,000	-	810,000
Bromobenzene	-	77,000	-	810,000
Bromochloromethane	-	77,000	-	810,000
Bromodichloromethane	-	77,000	-	810,000
Bromoform	-	77,000	-	810,000
Bromomethane	-	150,000	-	1,600,000
2-butanone	130,000 J	1,500,000	-	16,000,000
n-Butylbenzene	32,000 J	77,000	-	810,000
s-Butylbenzene	7,300 J	77,000	-	810,000
t-Butlybenzene	-	77,000	-	810,000
Carbon disulfide	-	77,000	-	810,000
Carbon tetrachloride	-	77,000	-	810,000
Chlorobenzene	170,000	77,000	280,000 J	810,000
Chorodibromomethane	-	77,000	-	810,000
Chloroethane	-	150,000	-	1,600,000
2-Chloroethyl vinyl ether	-	150,000	-	1,600,000
Chloroform	69,000 J	77,000	120,000 J	810,000
Chloromethane	-	150,000	-	1,600,000
2-Chlorotoluene	-	77,000	-	810,000
4-Chlorotoluene	-	77,000	-	810,000
1,2-Dibromo-3-Chloropropane	-	77,000	-	810,000
1,2-Dibromoethane	-	77,000	-	810,000
Dibromomethane	-	77,000	-	810,000
1,2-Dichlorobenzene	190,000	77,000	340,000 J	810,000
1,3-Dichlorobenzene	-	77,000	-	810,000
1,4-Dichlorobenzene	-	77,000	-	810,000
Dichlorodifluoromethane	-	150,000	-	1,600,000
1,1-Dichloroethane	67,000 J	77,000	110,000 J	810,000
1,2-Dichloroethane	69,000 J	77,000	130,000 J	810,000
1,1-Dichloroethene	-	77,000	-	810,000
cis-1,2-Dichloroethene	21,000 J	77,000	-	810,000
trans-1,2-Dichloroethene	-	77,000	-	810,000
1,2-Dichloropropane	-	77,000	-	810,000
1,3-Dichloropropane	-	77,000	-	810,000

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 21
Phase IV: Verification Testing
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (ug/kg)			
	A		B	
	Mixtures 021 & 023		Mixtures 022 & 024	
	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES				
2,2-Dichloropropane	-	77,000	-	810,000
cis-1,3-Dichloropropene	-	77,000	-	810,000
trans-1,3-Dichloropropene	-	77,000	-	810,000
1,1-Dichloropropene	-	77,000	-	810,000
Ethylbenzene	630,000	77,000	980,000	810,000
2-Hexanone	-	150,000	-	1,600,000
Hexachlorobutadiene	-	77,000	-	810,000
Isopropyl benzene	25,000 J	77,000	-	810,000
p-isopropyltoluene	8,600 J	77,000	-	810,000
4-Methyl-2-pentanone (MIBK)	210,000	150,000	-	1,600,000
Methylene chloride	100,000	77,000	160,000 J	810,000
Naphthalene	61,000 J	150,000	-	1,600,000
n-Propyl benzene	67,000 J	77,000	94,000 J	810,000
Styrene	-	77,000	-	810,000
1,1,1,2-Tetrachloroethane	-	77,000	-	810,000
1,1,2,2-Tetrachloroethane	-	77,000	-	810,000
Tetrachloroethene	5,200,000	77,000	6,300,000	810,000
Toluene	5,200,000	77,000	6,800,000	810,000
1,2,3-Trichlorobenzene	-	77,000	-	810,000
1,2,4-Trichlorobenzene	-	77,000	-	810,000
1,1,1-Trichloroethane	830,000	77,000	1,400,000	810,000
1,1,2-Trichloroethane	-	77,000	-	810,000
Trichloroethene	6,900,000	77,000	9,100,000	810,000
Trichlorofluoromethane	-	150,000	-	1,600,000
1,2,3-Trichloropropane	-	77,000	-	810,000
1,2,4-Trimethylbenzene	270,000	77,000	390,000 J	810,000
1,3,5-Trimethylbenzene	94,000	77,000	130,000 J	810,000
Vinyl Acetate	-	150,000	-	1,600,000
Vinyl Chloride	-	150,000	-	1,600,000
o-xylene	660,000	77,000	1,000,000	810,000
m-xylene	2,400,000	77,000	4,000,000	810,000
p-xylene	-	77,000	-	810,000

DL Detection Limit
J Estimated Value
\- Non Detectable concentrations

2964_225

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 22
Phase IV: Verification Testing
Summary of SPLP Volatile Organic Analyses - EPA Methods 1312/8260B
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (ug/L) A Mixtures 021 & 023		B Mixtures 022 & 024	
	Conc.	DL	Conc.	DL
I. SPLP VOLATILES				
Acetone	9,200 J	100,000	9,600 J	100,000
Benzene	740 J	5,000	860 J	5,000
Bromobenzene	-	5,000	-	5,000
Bromochloromethane	-	5,000	-	5,000
Bromodichloromethane	-	5,000	-	5,000
Bromoform	-	5,000	-	5,000
Bromomethane	520 J	10,000	-	10,000
2-butanone	8,600 J	100,000	8,900 J	100,000
n-Butylbenzene	-	5,000	-	5,000
s-Butylbenzene	-	5,000	-	5,000
t-Butlybenzene	-	5,000	-	5,000
Carbon disulfide	-	5,000	-	5,000
Carbon tetrachloride	-	5,000	-	5,000
Chlorobenzene	1,600 J	5,000	2,900 J	5,000
Chorodibromomethane	-	5,000	-	5,000
Chloroethane	-	10,000	-	10,000
2-Chloroethyl vinyl ether	-	10,000	-	10,000
Chloroform	2,500 J	5,000	3,200 J	5,000
Chloromethane	-	10,000	-	10,000
2-Chlorotoluene	-	5,000	-	5,000
4-Chlorotoluene	-	5,000	-	5,000
1,2-Dibromo-3-Chloropropane	-	5,000	-	5,000
1,2-Dibromoethane	-	5,000	-	5,000
Dibromomethane	-	5,000	-	5,000
1,2-Dichlorobenzene	530 J	5,000	2,400 J	5,000
1,3-Dichlorobenzene	-	5,000	-	5,000
1,4-Dichlorobenzene	-	5,000	-	5,000
Dichlorodifluoromethane	-	10,000	-	10,000
1,1-Dichloroethane	2,400 J	5,000	2,900 J	5,000
1,2-Dichloroethane	3,400 J	5,000	4,000 J	5,000
1,1-Dichloroethene	-	5,000	-	5,000
cis-1,2-Dichloroethene	780 J	5,000	960 J	5,000
trans-1,2-Dichloroethene	-	5,000	-	5,000
1,2-Dichloropropane	240 J	5,000	350 J	5,000
1,3-Dichloropropane	-	5,000	-	5,000

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 22
Phase IV: Verification Testing
Summary of SPLP Volatile Organic Analyses - EPA Methods 1312/8260B
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (ug/L) A Mixtures 021 & 023 Conc.	A DL	B Mixtures 022 & 024 Conc.	B DL
I. SPLP VOLATILES				
2,2-Dichloropropane	-	5,000	-	5,000
cis-1,3-Dichloropropene	-	5,000	-	5,000
trans-1,3-Dichloropropene	-	5,000	-	5,000
1,1-Dichloropropene	-	5,000	-	5,000
Ethylbenzene	2,800 J	5,000	8,700	5,000
2-Hexanone	-	10,000	-	10,000
Hexachlorobutadiene	-	5,000	-	5,000
Isopropyl benzene	-	5,000	260 J	5,000
p-isopropyltoluene	-	5,000	-	5,000
4-Methyl-2-pentanone (MIBK)	15,000	10,000	14,000	10,000
Methylene chloride	5,400	5,000	6,000	5,000
Naphthalene	820 J	10,000	720 J	10,000
n-Propyl benzene	-	5,000	690 J	5,000
Styrene	-	5,000	-	5,000
1,1,1,2-Tetrachloroethane	-	5,000	-	5,000
1,1,2,2-Tetrachloroethane	-	5,000	-	5,000
Tetrachloroethene	15,000	5,000	55,000	5,000
Toluene	49,000	5,000	79,000	5,000
1,2,3-Trichlorobenzene	340 J	5,000	-	5,000
1,2,4-Trichlorobenzene	-	5,000	-	5,000
1,1,1-Trichloroethane	12,000	5,000	21,000	5,000
1,1,2-Trichloroethane	-	5,000	-	5,000
Trichloroethene	87,000	5,000	130,000	5,000
Trichlorofluoromethane	-	10,000	-	10,000
1,2,3-Trichloropropane	-	5,000	-	5,000
1,2,4-Trimethylbenzene	560 J	5,000	3,000 J	5,000
1,3,5-Trimethylbenzene	-	5,000	1,000 J	5,000
Vinyl Acetate	-	10,000	-	10,000
Vinyl Chloride	-	10,000	-	10,000
o-xylene	3,300 J	5,000	9,800	5,000
m-xylene	11,000	5,000	35,000	5,000
p-xylene	-	5,000	-	5,000

DL Detection Limit
J Estimated Value
\- Non Detectable concentrations

2964_232

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 23
Phase IV: Verification Testing
Summary of Total Pesticide / PCB Analyses - EPA Method 8081/8082
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (ug/kg)			
	A Mixtures 021 & 023		B Mixtures 022 & 024	
	Conc.	DL	Conc.	DL
I. TOTAL PESTICIDES				
alpha-BHC	-	13	-	13
beta-BHC	-	13	-	13
delta-BHC	-	13	-	13
Heptachlor	-	13	-	13
Aldrin	-	13	-	13
Heptachlor epoxide	-	13	-	13
Endosulfan I	-	13	-	13
Dieldrin	-	27	-	26
4,4'-DDE	-	27	-	26
Endrin	-	27	-	26
Endosulfan II	-	27	-	26
4,4'-DDD	-	27	-	26
Endosulfan Sulfate	-	27	-	26
4,4'-DDT	-	27	-	26
Methoxychlor	-	130	-	130
Endrin Ketone	-	27	-	26
Endrin aldehyde	-	27	-	26
alpha-Chlordane	-	13	-	13
gamma-Chlordane	-	13	-	13
Toxaphene	-	270	-	260
gamma-BHC (Lindane)	-	13	-	13
II. TOTAL PCBs				
Aroclor-1016	-	25,000	-	27,000
Aroclor-1221	-	25,000	-	27,000
Aroclor-1232	-	25,000	-	27,000
Aroclor-1242	580,000	25,000	600,000	27,000
Aroclor-1248	-	25,000	-	27,000
Aroclor-1254	-	25,000	-	27,000
Aroclor-1260	-	25,000	-	27,000

DL Detection Limit
\- Non Detectable Concentrations

2964_226

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 24
Phase IV: Verification Testing
Summary of SPLP Pesticide / PCB Analyses - EPA Methods 1312/8081/8082
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (ug/L) A Mixtures 021 & 023		RESULTS (ug/L) B Mixtures 022 & 024	
	Conc.	DL	Conc.	DL
I. SPLP PESTICIDES				
alpha-BHC	-	0.055	-	0.055
beta-BHC	-	0.055	-	0.055
delta-BHC	-	0.055	-	0.055
Heptachlor	-	0.055	-	0.055
Aldrin	-	0.055	-	0.055
Heptachlor epoxide	-	0.055	-	0.055
Endosulfan I	-	0.055	-	0.055
Dieldrin	-	0.11	-	0.11
4,4'-DDE	-	0.11	-	0.11
Endrin	-	0.11	-	0.11
Endosulfan II	-	0.11	-	0.11
4,4'-DDD	-	0.11	-	0.11
Endosulfan Sulfate	-	0.11	-	0.11
4,4'-DDT	-	0.11	-	0.11
Methoxychlor	-	0.55	-	0.55
Endrin Ketone	-	0.11	-	0.11
Endrin aldehyde	-	0.11	-	0.11
alpha-Chlordane	-	0.055	-	0.055
gamma-Chlordane	-	0.055	-	0.055
Toxaphene	-	1.1	-	1.1
gamma-BHC (Lindane)	-	0.055	-	0.055
II. SPLP PCBs				
Aroclor-1016	-	10	-	10
Aroclor-1221	-	10	-	10
Aroclor-1232	-	10	-	10
Aroclor-1242	58	10	51	10
Aroclor-1248	-	10	-	10
Aroclor-1254	-	10	-	10
Aroclor-1260	-	10	-	10

DL Detection Limit
\- Non Detectable Concentrations

2964_233

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 25
Phase IV: Verification Testing
Summary of TAL Metals Analyses - EPA Methods 6010B / 7471 / 325.2
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (mg/kg) A Mixtures 021 & 023	B Mixtures 022 & 024
I. TOTAL TAL METALS		
Aluminum	**12,000**	**10,000**
Antimony	**5.6**	**4.1**
Arsenic	**12**	**11**
Barium	**630**	**580**
Beryllium	< 0.81	< 0.78
Cadmium	**30**	**29**
Calcium	**28,000**	**46,000**
Chromium	**210**	**230**
Cobalt	< 1.6	**1.8**
Copper	**4,800**	**5,300**
Iron	**21,000**	**19,000**
Lead	**810**	**750**
Magnesium	**3,900**	**4,600**
Manganese	**270**	**390**
Mercury	**20**	**8.8 J**
Nickel	**20**	**39**
Potassium	**1,100**	**1,100**
Selenium	**60**	**52**
Silver	**4.3**	**4.1**
Sodium	**17,000**	**15,000**
Thallium	< 3.2	< 3.1
Vanadium	**34**	**29**
Zinc	**2,600**	**2,000**
II. ADDITIONAL ANALYSES		
Total Chloride	9,400	10,000

- Non Detectable Concentrations
J Estimated Value

2964_227

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 26
Phase IV: Verification Testing
Summary of SPLP TAL Metals Analyses - EPA Methods 1312/6010B/7470/325.2
(Parent Material)

ANALYTICAL PARAMETER	RESULTS (mg/L)	
	A Mixtures 021 & 023	B Mixtures 022 & 024
I. SPLP TAL METALS		
Aluminum	**8.4**	**27**
Antimony	**0.022**	**0.03**
Arsenic	**0.027**	**0.055**
Barium	**0.25**	**0.38**
Beryllium	< 0.01	< 0.01
Cadmium	**0.021**	**0.044**
Calcium	**31**	**50**
Chromium	**0.28**	**0.49**
Cobalt	< 0.02	< 0.02
Copper	**4.4**	**10**
Iron	**13**	**26**
Lead	**0.94**	**1.6**
Magnesium	**3.4**	**7.2**
Manganese	**0.16**	**0.33**
Mercury	**0.016**	**0.022**
Nickel	**0.04**	**0.057**
Potassium	**3.2**	**6.7**
Selenium	< 0.01	< 0.01
Silver	< 0.01	< 0.01
Sodium	**480**	**480**
Thallium	**0.011**	< 0.01
Vanadium	**0.061**	**0.099**
Zinc	**2.9**	**4.7**

2964_234

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 27
Phase IV: Verification Testing
Summary of Mixture Development

KIBER SAMPLE No.	MATERIAL TYPE	REAGENT TYPE (1)	REAGENT ADDITION (%) (3)	WATER ADDITION (%) (3)
AIR STRIPPING (2)				
2964-021	Parent A	Type I Portland Cement	10	5
2964-022	Parent B	Type I Portland Cement / Hydrated Lime	10 / 10	17
AIR STRIPPING AND IRON ADDITION (3)				
2964-023	Parent A	Type I Portland Cement	20 / 5	4.5
2964-024	Parent B	Type I Portland Cement / Hydrated Lime	10 / 10	15

(1) Reagents were blended dry, slurried with water and added to the specified material and blended.
(2) These mixtures were developed with material that was air stripped for 120 minutes. After air stripping and iron addition for mixtures 022 and 024, the mixtures were allowed to set for 3 days at which time the stabilization reagents were added. After addition of the stabilization reagents, the materials were allowed to cure for a period of 28 days.
(3) For a mixture with 10% reagent addition and 10% water addition, 20 grams of reagent will be slurried with 20 grams of water and added to 200 grams of untreated m
(4) Unconfined compressive strength and volumetric expansion testing were performed after 28 days of curing.

2964_244

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 28
Phase IV: Verification Testing
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(After Air Stripping / Iron Addition and 3 Days of Curing)

ANALYTICAL PARAMETER	RESULTS (ug/kg)							
	10% Cement Addition				10% Cement / 10% Hydrated Lime			
	2964-021 w/o Iron Addition		2964-023 Iron Addition		2964-022 w/o Iron Addition		2964-024 Iron Addition	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES								
Acetone	-	150,000	-	1,400,000	-	1,500,000	-	1,400,000
Benzene	-	7,500	-	71,000	-	75,000	-	71,000
Bromobenzene	-	7,500	-	71,000	-	75,000	-	71,000
Bromochloromethane	-	7,500	-	71,000	-	75,000	-	71,000
Bromodichloromethane	-	7,500	-	71,000	-	75,000	-	71,000
Bromoform	-	7,500	-	71,000	-	75,000	-	71,000
Bromomethane	-	15,000	-	140,000	-	150,000	-	140,000
2-butanone	5,600 J	150,000	13,000 J	1,400,000	17,000 J	1,500,000	12,000 J	1,400,000
n-Butylbenzene	17,000	7,500	-	71,000	-	75,000	-	71,000
s-Butylbenzene	3,200 J	7,500	-	71,000	-	75,000	-	71,000
t-Butlybenzene	-	7,500	-	71,000	-	75,000	-	71,000
Carbon disulfide	-	7,500	-	71,000	-	75,000	-	71,000
Carbon tetrachloride	-	7,500	-	71,000	-	75,000	-	71,000
Chlorobenzene	24,000	7,500	22,000 J	71,000	44,000 J	75,000	23,000 J	71,000
Chorodibromomethane	-	7,500	-	71,000	-	75,000	-	71,000
Chloroethane	-	15,000	-	140,000	-	150,000	-	140,000
2-Chloroethyl vinyl ether	-	15,000	-	140,000	-	150,000	-	140,000
Chloroform	890 J	7,500	-	71,000	-	75,000	-	71,000
Chloromethane	-	15,000	-	140,000	-	150,000	-	140,000
2-Chlorotoluene	-	7,500	-	71,000	-	75,000	-	71,000
4-Chlorotoluene	390 J	7,500	-	71,000	-	75,000	-	71,000
1,2-Dibromo-3-Chloropropane	-	7,500	-	71,000	-	75,000	-	71,000
1,2-Dibromoethane	-	7,500	-	71,000	-	75,000	-	71,000
Dibromomethane	-	7,500	-	71,000	-	75,000	-	71,000
1,2-Dichlorobenzene	120,000	7,500	74,000	71,000	120,000	75,000	89,000	71,000
1,3-Dichlorobenzene	-	7,500	-	71,000	-	75,000	-	71,000
1,4-Dichlorobenzene	2,300 J	7,500	-	71,000	-	75,000	-	71,000
Dichlorodifluoromethane	-	15,000	-	140,000	-	150,000	-	140,000
1,1-Dichloroethane	-	7,500	-	71,000	-	75,000	-	71,000
1,2-Dichloroethane	-	7,500	-	71,000	-	75,000	-	71,000
1,1-Dichloroethene	-	7,500	-	71,000	-	75,000	-	71,000
cis-1,2-Dichloroethene	-	7,500	-	71,000	-	75,000	-	71,000
trans-1,2-Dichloroethene	-	7,500	-	71,000	-	75,000	-	71,000
1,2-Dichloropropane	-	7,500	-	71,000	-	75,000	-	71,000
1,3-Dichloropropane	-	7,500	-	71,000	-	75,000	-	71,000

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 28
Phase IV: Verification Testing
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(After Air Stripping / Iron Addition and 3 Days of Curing)

ANALYTICAL PARAMETER	RESULTS (ug/kg)							
	10% Cement Addition				10% Cement / 10% Hydrated Lime			
	2964-021 w/o Iron Addition		2964-023 Iron Addition		2964-022 w/o Iron Addition		2964-024 Iron Addition	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES								
2,2-Dichloropropane	-	7,500	-	71,000	-	75,000	-	71,000
cis-1,3-Dichloropropene	-	7,500	-	71,000	-	75,000	-	71,000
trans-1,3-Dichloropropene	-	7,500	-	71,000	-	75,000	-	71,000
1,1-Dichloropropene	-	7,500	-	71,000	-	75,000	-	71,000
Ethylbenzene	110,000	7,500	100,000	71,000	190,000	75,000	100,000	71,000
2-Hexanone	-	15,000	-	140,000	-	150,000	-	140,000
Hexachlorobutadiene	-	7,500	-	71,000	-	75,000	-	71,000
Isopropyl benzene	7,400 J	7,500	6,000 J	71,000	10,000 J	75,000	5,700 J	71,000
p-isopropyltoluene	4,600 J	7,500	3,500 J	71,000	4,600 J	75,000	-	71,000
4-Methyl-2-pentanone (MIBK)	9,500 J	15,000	-	140,000	-	150,000	-	140,000
Methylene chloride	1,200 J	7,500	-	71,000	-	75,000	-	71,000
Naphthalene	46,000	7,500	39,000 J	71,000	51,000 J	75,000	34,000 J	71,000
n-Propyl benzene	25,000	7,500	19,000 J	71,000	31,000 J	75,000	19,000 J	71,000
Styrene	-	7,500	-	71,000	-	75,000	-	71,000
1,1,1,2-Tetrachloroethane	-	7,500	-	71,000	-	75,000	-	71,000
1,1,2,2-Tetrachloroethane	-	7,500	-	71,000	-	75,000	-	71,000
Tetrachloroethene	430,000	7,500	520,000	71,000	980,000	75,000	480,000	71,000
Toluene	220,000	7,500	310,000	71,000	620,000	75,000	320,000	71,000
1,2,3-Trichlorobenzene	-	7,500	-	71,000	-	75,000	-	71,000
1,2,4-Trichlorobenzene	3,700 J	7,500	-	71,000	-	75,000	-	71,000
1,1,1-Trichloroethane	14,000	7,500	27,000 J	71,000	49,000 J	75,000	30,000 J	71,000
1,1,2-Trichloroethane	-	7,500	-	71,000	-	75,000	-	71,000
Trichloroethene	150,000	7,500	270,000	71,000	510,000	75,000	290,000	71,000
Trichlorofluoromethane	-	15,000	-	140,000	-	150,000	-	140,000
1,2,3-Trichloropropane	-	7,500	-	71,000	-	75,000	-	71,000
1,2,4-Trimethylbenzene	130,000	7,500	100,000	71,000	160,000	75,000	100,000	71,000
1,3,5-Trimethylbenzene	42,000	7,500	33,000 J	71,000	48,000 J	75,000	33,000 J	71,000
Vinyl Acetate	-	15,000	-	140,000	-	150,000	-	140,000
Vinyl Chloride	-	15,000	-	140,000	-	150,000	-	140,000
o-xylene	160,000	7,500	140,000	71,000	270,000	75,000	150,000	71,000
m-xylene	430,000	7,500	470,000	71,000	850,000	75,000	470,000	71,000
p-xylene	-	7,500	-	71,000	-	75,000	-	71,000

DL Detection Limit
J Estimated Value
\- Non Detectable concentrations

2964_230

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 29
Phase IV: Verification Testing
Summary of Total PCB Analyses - EPA Method 8082/325.2
(After Air Stripping / Iron Addition and 3 Days of Curing)

ANALYTICAL PARAMETER	RESULTS (ug/kg)							
	10% Cement Addition				10% Cement / 10% Hydrated Lime			
	2964-021 w/o Iron Addition		2964-023 Iron Addition		2964-022 w/o Iron Addition		2964-024 Iron Addition	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL PCBs								
Aroclor-1016	-	250,000	-	240,000	-	250,000	-	240,000
Aroclor-1221	-	250,000	-	240,000	-	250,000	-	240,000
Aroclor-1232	-	250,000	-	240,000	-	250,000	-	240,000
Aroclor-1242	690,000	250,000	1,700,000	240,000	1,200,000	250,000	1,200,000	240,000
Aroclor-1248	-	250,000	-	240,000	-	250,000	-	240,000
Aroclor-1254	-	250,000	-	240,000	-	250,000	-	240,000
Aroclor-1260	-	250,000	-	240,000	-	250,000	-	240,000
II. ADDITIONAL ANALYSES								
Total Chloride (mg/kg)	7,400	1,200	5,800	1,100	7,700	1,200	6,100	1,100

DL Detection Limit
\- Non Detectable Concentrations

400153

2964_231

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 30
Phase IV: Verification Testing
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(28 Day Cure)

ANALYTICAL PARAMETER	RESULTS (ug/kg)							
	10% Cement Addition				10% Cement / 10% Hydrated Lime			
	2964-021 w/o Iron Addition		2964-023 Iron Addition		2964-022 w/o Iron Addition		2964-024 Iron Addition	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES								
Acetone	-	170,000	12,000 J	160,000	11,000 J	170,000	9,200 J	160,000
Benzene	-	8,300	-	7,900	-	8,600	-	8,000
Bromobenzene	-	8,300	-	7,900	-	8,600	-	8,000
Bromochloromethane	-	8,300	-	7,900	-	8,600	-	8,000
Bromodichloromethane	-	8,300	-	7,900	-	8,600	-	8,000
Bromoform	-	8,300	-	7,900	-	8,600	-	8,000
Bromomethane	-	17,000	-	16,000	-	17,000	-	16,000
2-butanone	-	170,000	8,300 J	160,000	7,100 J	170,000	6,500 J	160,000
n-Butylbenzene	10,000	8,300	12,000	7,900	10,000	8,600	7,900 J	8,000
s-Butylbenzene	1,700 J	8,300	2,200 J	7,900	1,900 J	8,600	1,400 J	8,000
t-Butlybenzene	-	8,300	-	7,900	-	8,600	-	8,000
Carbon disulfide	-	8,300	-	7,900	-	8,600	-	8,000
Carbon tetrachloride	-	8,300	-	7,900	-	8,600	-	8,000
Chlorobenzene	7,600 J	8,300	16,000	7,900	13,000	8,600	8,100	8,000
Chorodibromomethane	-	8,300	-	7,900	-	8,600	-	8,000
Chloroethane	-	17,000		16,000	-	17,000	-	16,000
2-Chloroethyl vinyl ether	-	17,000	-	16,000	-	17,000	-	16,000
Chloroform	-	8,300	-	7,900	-	8,600	-	8,000
Chloromethane	-	17,000	-	16,000	-	17,000	-	16,000
2-Chlorotoluene	-	8,300	-	7,900	-	8,600	-	8,000
4-Chlorotoluene	-	8,300	-	7,900	-	8,600	-	8,000
1,2-Dibromo-3-Chloropropane	-	8,300	-	7,900	-	8,600	-	8,000
1,2-Dibromoethane	-	8,300	-	7,900	-	8,600	-	8,000
Dibromomethane	-	8,300	-	7,900	-	8,600	-	8,000
1,2-Dichlorobenzene	64,000	8,300	70,000	7,900	63,000	8,600	52,000	8,000
1,3-Dichlorobenzene	-	8,300	-	7,900	-	8,600	-	8,000
1,4-Dichlorobenzene	1,200 J	8,300	1,400 J	7,900	1,300 J	8,600	1,000 J	8,000
Dichlorodifluoromethane	-	17,000	-	16,000	-	17,000	-	16,000
1,1-Dichloroethane	-	8,300	-	7,900	-	8,600	-	8,000
1,2-Dichloroethane	-	8,300	-	7,900	-	8,600	-	8,000
1,1-Dichloroethene	-	8,300	-	7,900	-	8,600	-	8,000
cis-1,2-Dichloroethene	-	8,300	-	7,900	-	8,600	-	8,000
trans-1,2-Dichloroethene	-	8,300	-	7,900	-	8,600	-	8,000
1,2-Dichloropropane	-	8,300	-	7,900	-	8,600	-	8,000
1,3-Dichloropropane	-	8,300	-	7,900	-	8,600	-	8,000

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 30
Phase IV: Verification Testing
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(28 Day Cure)

ANALYTICAL PARAMETER	RESULTS (ug/kg)							
	10% Cement Addition				10% Cement / 10% Hydrated Lime			
	2964-021 w/o Iron Addition		2964-023 Iron Addition		2964-022 w/o Iron Addition		2964-024 Iron Addition	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES								
2,2-Dichloropropane	-	8,300	-	7,900	-	8,600	-	8,000
cis-1,3-Dichloropropene	-	8,300	-	7,900	-	8,600	-	8,000
trans-1,3-Dichloropropene	-	8,300	-	7,900	-	8,600	-	8,000
1,1-Dichloropropene	-	8,300	-	7,900	-	8,600	-	8,000
Ethylbenzene	38,000	8,300	76,000	7,900	62,000	8,600	43,000	8,000
2-Hexanone	-	17,000	-	16,000	-	17,000	-	16,000
Hexachlorobutadiene	1,000 J	8,300	-	7,900	-	8,600	-	8,000
Isopropyl benzene	3,200 J	8,300	5,100 J	7,900	4,400 J	8,600	3,000 J	8,000
p-isopropyltoluene	2,500 J	8,300	3,000 J	7,900	2,600 J	8,600	2,100 J	8,000
4-Methyl-2-pentanone (MIBK)	-	17,000	-	16,000	-	17,000	-	16,000
Methylene chloride	-	8,300	-	7,900	-	8,600	-	8,000
Naphthalene	43,000	8,300	57,000	16,000	38,000	8,600	32,000	16,000
n-Propyl benzene	11,000	8,300	17,000	7,900	15,000	8,600	10,000	8,000
Styrene	-	8,300	-	7,900	-	8,600	-	8,000
1,1,1,2-Tetrachloroethane	-	8,300	-	7,900	-	8,600	-	8,000
1,1,2,2-Tetrachloroethane	-	8,300	-	7,900	-	8,600	-	8,000
Tetrachloroethene	120,000	8,300	300,000	7,900	230,000	8,600	170,000	8,000
Toluene	48,000	8,300	190,000	7,900	100,000	8,600	73,000	8,000
1,2,3-Trichlorobenzene	1,300 J	8,300	-	7,900	-	8,600	-	8,000
1,2,4-Trichlorobenzene	3,200 J	8,300	2,900 J	7,900	2,300 J	8,600	2,200 J	8,000
1,1,1-Trichloroethane	-	8,300	13,000	7,900	1,900 J	8,600	2,700 J	8,000
1,1,2-Trichloroethane	-	8,300	-	7,900	-	8,600	-	8,000
Trichloroethene	17,000	8,300	140,000	7,900	36,000	8,600	41,000	8,000
Trichlorofluoromethane	-	17,000	-	16,000	-	17,000	-	16,000
1,2,3-Trichloropropane	-	8,300	-	7,900	-	8,600	-	8,000
1,2,4-Trimethylbenzene	68,000	8,300	93,000	7,900	81,000	8,600	57,000	8,000
1,3,5-Trimethylbenzene	20,000	8,300	27,000	7,900	25,000	8,600	17,000	8,000
Vinyl Acetate	-	17,000	-	16,000	-	17,000	-	16,000
Vinyl Chloride	-	17,000	-	16,000	-	17,000	-	16,000
o-xylene	66,000	8,300	110,000	7,900	97,000	8,600	64,000	8,000
m-xylene	190,000	8,300	330,000	7,900	290,000	8,600	190,000	8,000
p-xylene	-	8,300	-	7,900	-	8,600	-	8,000

DL Detection Limit
J Estimated Value
\- Non Detectable concentrations

2964_236

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 31
Phase IV: Verification Testing
Summary of SPLP Volatile Organic Analyses - EPA Methods 1312/8260B
(28 Day Cure)

ANALYTICAL PARAMETER	RESULTS (ug/L)							
	10% Cement Addition				10% Cement / 10% Hydrated Lime			
	2964-021 w/o Iron Addition		2964-023 Iron Addition		2964-022 w/o Iron Addition		2964-024 Iron Addition	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. SPLP VOLATILES								
Acetone	440 J	1,000	170 J	1,000	210 J	1,000	470 J	1,000
Benzene	11 J	50	-	50	-	50	2.2 J	50
Bromobenzene	-	50	-	50	-	50	-	50
Bromochloromethane	-	50	-	50	-	50	-	50
Bromodichloromethane	-	50	-	50	-	50	-	50
Bromoform	-	50	-	50	-	50	-	50
Bromomethane	-	100	-	100	-	100	-	100
2-butanone	160 J	1,000	37 J	1,000	43 J	1,000	130 J	1,000
n-Butylbenzene	39 J	50	9.0 J	50	9.5 J	50	15 J	50
s-Butylbenzene	8.3 J	50	-	50	-	50	-	50
t-Butlybenzene	-	50	-	50	-	50	-	50
Carbon disulfide	12 J	50	-	50	-	50	-	50
Carbon tetrachloride	-	50	-	50	-	50	-	50
Chlorobenzene	360	50	70	50	170	50	230	50
Chorodibromomethane	-	50	-	50	-	50	-	50
Chloroethane	-	100	-	100	-	100	-	100
2-Chloroethyl vinyl ether	-	100	-	100	-	100	-	100
Chloroform	13 J	50	-	50	-	50	-	50
Chloromethane	-	100	-	100	-	100	-	100
2-Chlorotoluene	-	50	-	50	-	50	-	50
4-Chlorotoluene	-	50	-	50	-	50	-	50
1,2-Dibromo-3-Chloropropane	-	50	-	50	-	50	-	50
1,2-Dibromoethane	-	50	-	50	-	50	-	50
Dibromomethane	-	50	-	50	-	50	-	50
1,2-Dichlorobenzene	870	50	270	50	370	50	660	50
1,3-Dichlorobenzene	3.3 J	50	-	50	-	50	-	50
1,4-Dichlorobenzene	18 J	50	4.6 J	50	5.8 J	50	11 J	50
Dichlorodifluoromethane	-	100	-	100	-	100	-	100
1,1-Dichloroethane	9.5 J	50	-	50	-	50	-	50
1,2-Dichloroethane	16 J	50	-	50	-	50	-	50
1,1-Dichloroethene	3.0 J	50	-	50	-	50	-	50
cis-1,2-Dichloroethene	9.2 J	50	-	50	-	50	-	50
trans-1,2-Dichloroethene	-	50	-	50	-	50	-	50
1,2-Dichloropropane	4.5 J	50	-	50	1.3 J	50	1.3 J	50
1,3-Dichloropropane	-	50	-	50	-	50	-	50

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 31
Phase IV: Verification Testing
Summary of SPLP Volatile Organic Analyses - EPA Methods 1312/8260B
(28 Day Cure)

ANALYTICAL PARAMETER	RESULTS (ug/L)							
	10% Cement Addition				10% Cement / 10% Hydrated Lime			
	2964-021 w/o Iron Addition		2964-023 Iron Addition		2964-022 w/o Iron Addition		2964-024 Iron Addition	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. SPLP VOLATILES								
2,2-Dichloropropane	-	50	-	50	-	50	-	50
cis-1,3-Dichloropropene	-	50	-	50	-	50	-	50
trans-1,3-Dichloropropene	-	50	-	50	-	50	-	50
1,1-Dichloropropene	-	50	-	50	-	50	-	50
Ethylbenzene	1,100	50	240	50	570	50	710	50
2-Hexanone	-	100	-	100	-	100	-	100
Hexachlorobutadiene	6.1 J	50	-	50	-	50	-	50
Isopropyl benzene	35 J	50	7.6 J	50	14 J	50	19 J	50
p-isopropyltoluene	-	50	-	50	3.4 J	50	5.4 J	50
4-Methyl-2-pentanone (MIBK)	160	100	13 J	100	39 J	100	120	100
Methylene chloride	8.8 J	50	-	50	-	50	-	50
Naphthalene	360	50	160	50	170	50	290	50
n-Propyl benzene	96	50	25 J	50	39 J	50	55	50
Styrene	-	50	-	50	-	50	-	50
1,1,1,2-Tetrachloroethane	-	50	-	50	-	50	-	50
1,1,2,2-Tetrachloroethane	-	50	-	50	-	50	-	50
Tetrachloroethene	3,600	50	670	50	2,200	50	2,200	50
Toluene	4,100	50	630	50	2,400	50	2,500	50
1,2,3-Trichlorobenzene	-	50	-	50	-	50	-	50
1,2,4-Trichlorobenzene	13 J	50	2.9 J	50	3.2 J	50	5.8 J	50
1,1,1-Trichloroethane	210	50	6.3 J	50	73	50	36 J	50
1,1,2-Trichloroethane	-	50	-	50	-	50	-	50
Trichloroethene	2,600	50	120	50	1,100	50	1,000	50
Trichlorofluoromethane	-	100	-	100	-	100	-	100
1,2,3-Trichloropropane	-	50	-	50	-	50	-	50
1,2,4-Trimethylbenzene	650	50	210	50	280	50	420	50
1,3,5-Trimethylbenzene	190	50	57	50	79	50	110	50
Vinyl Acetate	-	100	-	100	-	100	-	100
Vinyl Chloride	10 J	100	-	100	-	100	-	100
o-xylene	2,100	50	490	50	1,000	50	1,300	50
m-xylene	4,800	50	1,300	50	2,800	50	3,300	50
p-xylene	-	50	-	50	-	50	-	50

DL Detection Limit
J Estimated Value
\- Non Detectable concentrations

2964_237

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 32
Phase IV: Verification Testing
Summary of Total PCB & Pesticide Analyses - EPA Method 8081/8082/325.2/1010
(28 Day Cure)

ANALYTICAL PARAMETER	RESULTS (ug/kg)							
	10% Cement Addition				10% Cement / 10% Hydrated Lime			
	2964-021 w/o Iron Addition		2964-023 Iron Addition		2964-022 w/o Iron Addition		2964-024 Iron Addition	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL PESTICIDES								
alpha-BHC	-	220	-	210	-	230	-	210
beta-BHC	-	220	-	210	-	230	-	210
delta-BHC	-	220	-	210	-	230	-	210
gamma-BHC (Lindane)	-	220	-	210	-	230	-	210
Heptachlor	-	220	-	210	-	230	-	210
Aldrin	-	220	-	210	-	230	-	210
Heptachlor epoxide	-	220	-	210	-	230	-	210
Endosulfan I	-	220	-	210	-	230	-	210
Dieldrin	-	440	-	420	-	450	-	420
4,4'-DDE	-	440	-	420	-	450	-	420
Endrin	-	440	-	420	-	450	-	420
Endosulfan II	-	440	-	420	-	450	-	420
4,4'-DDD	-	440	-	420	-	450	-	420
Endosulfan Sulfate	-	440	-	420	-	450	-	420
4,4'-DDT	-	440	-	420	-	450	-	420
Methoxychlor	-	2,200	-	2,100	-	2,300	-	2,100
Endrin Ketone	-	440	-	420	-	450	-	420
Endrin aldehyde	-	440	-	420	-	450	-	420
alpha-Chlordane	-	220	-	210	-	230	-	210
gamma-Chlordane	-	220	-	210	-	230	-	210
Toxaphene	-	4400	-	4200	-	4500	-	4200
II. TOTAL PCBs								
Aroclor-1016	-	22,000	-	21,000	-	23,000	-	21,000
Aroclor-1221	-	22,000	-	21,000	-	23,000	-	21,000
Aroclor-1232	-	22,000	-	21,000	-	23,000	-	21,000
Aroclor-1242	450,000	22,000	380,000	21,000	390,000	23,000	290,000	21,000
Aroclor-1248	-	22,000	-	21,000	-	23,000	-	21,000
Aroclor-1254	-	22,000	-	21,000	-	23,000	-	21,000
Aroclor-1260	-	22,000	-	21,000	-	23,000	-	21,000
II. ADDITIONAL ANALYSES								
Total Chloride (mg/kg)	5,700	210	3,000	200	4,200	220	5,800	210
Ignitability, Flash Point (°C)	> 95	NA	> 95	NA	> 95	NA	> 95	NA

DL Detection Limit
\- Non Detectable Concentrations
NA Not Applicable

2964_238

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 33
Phase IV: Verification Testing
Summary of SPLP PCB & Pesticide Analyses - EPA Method 1312/8081/8082
(28 Day Cure)

ANALYTICAL PARAMETER	RESULTS (ug/L)							
	10% Cement Addition				10% Cement / 10% Hydrated Lime			
	2964-021 w/o Iron Addition		2964-023 Iron Addition		2964-022 w/o Iron Addition		2964-024 Iron Addition	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. SPLP PESTICIDES								
alpha-BHC	-	0.50	-	0.50	-	0.50	-	0.50
beta-BHC	-	0.50	-	0.50	-	0.50	-	0.50
delta-BHC	-	0.50	-	0.50	-	0.50	-	0.50
gamma-BHC (Lindane)	-	0.50	-	0.50	-	0.50	-	0.50
Heptachlor	-	0.50	-	0.50	-	0.50	-	0.50
Aldrin	-	0.50	-	0.50	-	0.50	-	0.50
Heptachlor epoxide	-	0.50	-	0.50	-	0.50	-	0.50
Endosulfan I	-	0.50	-	0.50	-	0.50	-	0.50
Dieldrin	-	1.0	-	1.0	-	1.0	-	1.0
4,4'-DDE	-	1.0	-	1.0	-	1.0	-	1.0
Endrin	-	1.0	-	1.0	-	1.0	-	1.0
Endosulfan II	-	1.0	-	1.0	-	1.0	-	1.0
4,4'-DDD	-	1.0	-	1.0	-	1.0	-	1.0
Endosulfan Sulfate	-	1.0	-	1.0	-	1.0	-	1.0
4,4'-DDT	-	1.0	-	1.0	-	1.0	-	1.0
Methoxychlor	-	5.0	-	5.0	-	5.0	-	5.0
Endrin Ketone	-	1.0	-	1.0	-	1.0	-	1.0
Endrin aldehyde	-	1.0	-	1.0	-	1.0	-	1.0
alpha-Chlordane	-	0.50	-	0.50	-	0.50	-	0.50
gamma-Chlordane	-	0.50	-	0.50	-	0.50	-	0.50
Toxaphene	-	10	-	10	-	10	-	10
II. SPLP PCBs								
Aroclor-1016	-	0.50	-	0.50	-	0.50	-	0.50
Aroclor-1221	-	0.50	-	0.50	-	0.50	-	0.50
Aroclor-1232	-	0.50	-	0.50	-	0.50	-	0.50
Aroclor-1242	2.0	0.50	0.52	0.50	0.60	0.50	1.2	0.50
Aroclor-1248	-	0.50	-	0.50	-	0.50	-	0.50
Aroclor-1254	-	0.50	-	0.50	-	0.50	-	0.50
Aroclor-1260	-	0.50	-	0.50	-	0.50	-	0.50

DL Detection Limit
\- Non Detectable Concentrations

2964_239

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 34
Phase IV: Verification Testing
Summary of Total TAL Metals Analyses - EPA Methods 6010B / 7471
(28 Day Cure)

ANALYTICAL PARAMETER	RESULTS (mg/kg)							
	10% Cement Addition				10% Cement / 10% Hydrated Lime			
	2964-021		2964-023		2964-022		2964-024	
	w/o Iron Addition		Iron Addition		w/o Iron Addition		Iron Addition	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL TAL METALS								
Aluminum	12,800	6.7	9,800	6.3	11,000	6.8	9,000	6.4
Antimony	4.2	1.3	5.8	1.3	5.0	1.4	3.1	1.3
Arsenic	14	2.7	35	25	13	2.7	33	26
Barium	676	0.67	600	0.63	660	0.68	450	0.64
Beryllium	-	0.67	-	0.63	-	0.68	-	0.64
Cadmium	29.9	0.67	24	0.63	29	0.68	17	0.64
Calcium	75,500	1,300	69,000	1,300	120,000	1,400	120,000	1,300
Chromium	292	1.3	300	1.3	250	1.4	200	1.3
Cobalt	4.97	1.3	13	1.3	3.9	1.4	10	1.3
Copper	3,510	130	3,000	1.3	2,700	140	2,800	1.3
Iron	20,800	2.7	130,000	250	19,000	2.7	87,000	260
Lead	1,100	330	960	320	790	140	590	320
Magnesium	5,830	33	4,600	32	5,300	34	4,700	32
Manganese	291	0.67	620	0.63	280	0.68	500	0.64
Mercury	9.9	3.3	7.2	3.2	7.6 J	17	1.3 J	3.2
Nickel	60.1	2.7	160	2.5	48	2.7	76	2.6
Potassium	1,260	67	900	63	1,200	68	1,000	64
Selenium	3.5	2.7	1.8	1.3	6.2	5.5	2.7	2.6
Silver	-	2.7	-	2.5	-	2.7	-	2.6
Sodium	10,900	33	8,800	32	9,000	34	15,000	32
Thallium	-	0.67	1.1	0.63	0.85	0.68	0.94	0.32
Vanadium	38.8	0.67	47	0.63	35	0.68	37	0.64
Zinc	2,850	1.3	2,500	1.3	2,700	1.4	1,600	1.3

- Non Detectable Concentrations
DL Detection Limit
J Estimated Value

2964_240

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 35
Phase IV: Verification Testing
Summary of SPLP TAL Metals Analyses - EPA Methods 1312 / 6010B / 7470
(28 Day Cure)

ANALYTICAL PARAMETER	RESULTS (mg/L)							
	10% Cement Addition				10% Cement / 10% Hydrated Lime			
	2964-021		2964-023		2964-022		2964-024	
	w/o Iron Addition		Iron Addition		w/o Iron Addition		Iron Addition	
	Conc.	DL	Conc.	DL	Conc.	DL	Conc.	DL
I. SPLP TAL METALS								
Aluminum	0.21	0.10	0.22	0.10	0.17	0.10	-	0.10
Antimony	-	0.02	-	0.02	-	0.02	-	0.02
Arsenic	0.014	0.004	0.013	0.004	0.014	0.004	0.0098	0.004
Barium	0.046	0.01	0.054	0.01	0.063	0.01	0.077	0.01
Beryllium	-	0.01	-	0.01	-	0.01	-	0.01
Cadmium	-	0.01	-	0.01	-	0.01	-	0.01
Calcium	150	0.20	160	0.20	410	0.20	430	0.20
Chromium	0.03	0.02	0.023	0.02	-	0.02	-	0.02
Cobalt	-	0.02	-	0.02	-	0.02	-	0.02
Copper	1.4	0.02	2.4	0.02	3.0	0.02	3.1	0.02
Iron	0.32	0.04	0.30	0.04	0.18	0.04	0.071	0.04
Lead	-	0.005	-	0.005	0.17	0.025	0.096	0.025
Magnesium	-	0.50	-	0.50	-	0.50	-	0.50
Manganese	-	0.01	-	0.01	-	0.01	-	0.01
Mercury	0.0024	0.0002	0.001	0.0002	0.0011	0.0002	0.00087	0.0002
Nickel	0.05	0.04	0.043	0.04	0.055	0.04	-	0.04
Potassium	10	1.0	9.2	1.0	9.8	1.0	8.4	1.0
Selenium	-	0.004	-	0.004	-	0.004	-	0.004
Silver	-	0.01	-	0.01	-	0.01	-	0.01
Sodium	470	2.5	350	2.5	330	2.5	300	2.5
Thallium	-	0.005	-	0.005	-	0.005	-	0.005
Vanadium	0.029	0.01	0.021	0.01	-	0.01	-	0.01
Zinc	0.027	0.02	0.024	0.02	0.41	0.02	0.15	0.02

- Non Detectable Concentrations
J Estimated Value
DL Detection Limit

2964_241

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 36
Phase IV: Verification Testing
Summary of Unconfined Compressive Strength Testing - ASTM D 2166
(28 Day Cure)

KIBER SAMPLE No.	MATERIAL TYPE	REAGENT TYPE (1)	REAGENT ADDITION (%) (3)	WATER ADDITION (%) (3)	UNCONFINED COMPRESSIVE STRENGTH TESTING (UCS) (4) Moisture Content (%)	Bulk Density (lbs/ft²)	Dry Density (lbs/ft²)	UCS (lbs/in²)	VOLUMETRIC EXPANSION (%) (4)
		AIR STRIPPING (2)							
2964-021	Parent A	Type I Portland Cement	10	5	29	105	81	71	4
2964-022	Parent B	Type I Portland Cement / Hydrated Lime	10 / 10	17	30	92	71	53	32
		AIR STRIPPING AND IRON ADDITION (3)							
2964-023	Parent A	Type I Portland Cement	10	4.5	22	113	92	84	7
2964-024	Parent B	Type I Portland Cement / Hydrated Lime	10 / 10	15	31	102	79	42	32

(1) Reagents were blended dry, slurried with water and added to the specified material and blended.
(2) These mixtures were developed with material that was air stripped for 120 minutes. After air stripping and iron addition for mixtures 022 and 024, the mixtures were allowed to set for 3 days at which time the stabilization reagents were added. After addition of the stabilization reagents, the materials were allowed to cure for a period of 28 days.
(3) For a mixture with 10% reagent addition and 10% water addition, 20 grams of reagent will be slurried with 20 grams of water and added to 200 grams of untreated material.
(4) Unconfined compressive strength and volumetric expansion testing were performed after 28 days of curing.

2964_235

400162

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 37
Phase IV: Verification Testing
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(Control Samples)

ANALYTICAL PARAMETER	RESULTS (ug/kg)					
	Initial Control		Control - 3 Days		Final Control - 28 Days	
	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES						
Acetone	170,000 J	1,600,000	73,000 J	1,600,000	-	1,800,000
Benzene	30,000 J	79,000	18,000 J	79,000	-	89,000
Bromobenzene	-	79,000	-	79,000	-	89,000
Bromochloromethane	-	79,000	-	79,000	-	89,000
Bromodichloromethane	-	79,000	-	79,000	-	89,000
Bromoform	-	79,000	-	79,000	-	89,000
Bromomethane	-	160,000	-	160,000	-	180,000
2-butanone	170,000 J	1,600,000	74,000 J	1,600,000	-	1,800,000
n-Butylbenzene	28,000 J	79,000	28,000 J	79,000	15,000 J	89,000
s-Butylbenzene	6,800 J	79,000	8,400 J	79,000	-	89,000
t-Butlybenzene	-	79,000	-	79,000	-	89,000
Carbon disulfide	-	79,000	-	79,000	-	89,000
Carbon tetrachloride	-	79,000	-	79,000	-	89,000
Chlorobenzene	190,000	79,000	150,000 J	79,000	42,000 J	89,000
Chorodibromomethane	-	79,000	-	79,000	-	89,000
Chloroethane	-	160,000	-	160,000	-	180,000
2-Chloroethyl vinyl ether	-	160,000	-	160,000	-	180,000
Chloroform	81,000	79,000	49,000 J	79,000	-	89,000
Chloromethane	-	160,000	-	160,000	-	180,000
2-Chlorotoluene	-	79,000	-	79,000	-	89,000
4-Chlorotoluene	-	79,000	-	79,000	-	89,000
1,2-Dibromo-3-Chloropropane	-	79,000	-	79,000	-	89,000
1,2-Dibromoethane	-	79,000	-	79,000	-	89,000
Dibromomethane	-	79,000	-	79,000	-	89,000
1,2-Dichlorobenzene	200,000	79,000	180,000 J	79,000	86,000 J	89,000
1,3-Dichlorobenzene	-	79,000	-	79,000	-	89,000
1,4-Dichlorobenzene	-	79,000	-	79,000	-	89,000
Dichlorodifluoromethane	-	160,000	-	160,000	-	180,000
1,1-Dichloroethane	-	79,000	30,000 J	79,000	-	89,000
1,2-Dichloroethane	-	79,000	45,000 J	79,000	-	89,000
1,1-Dichloroethene	-	79,000	-	79,000	-	89,000
cis-1,2-Dichloroethene	20,000 J	79,000	11,000 J	79,000	-	89,000
trans-1,2-Dichloroethene	-	79,000	-	79,000	-	89,000
1,2-Dichloropropane	13,000 J	79,000	-	79,000	-	89,000
1,3-Dichloropropane	-	79,000	-	79,000	-	89,000

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 37
Phase IV: Verification Testing
Summary of Total Volatile Organic Analyses - EPA Method 8260B
(Control Samples)

ANALYTICAL PARAMETER	RESULTS (ug/kg)					
	Initial Control		Control - 3 Days		Final Control - 28 Days	
	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL VOLATILES						
2,2-Dichloropropane	-	79,000	-	79,000	-	89,000
cis-1,3-Dichloropropene	-	79,000	-	79,000	-	89,000
trans-1,3-Dichloropropene	-	79,000	-	79,000	-	89,000
1,1-Dichloropropene	-	79,000	-	79,000	-	89,000
Ethylbenzene	730,000	79,000	630,000	79,000	210,000	89,000
2-Hexanone	-	160,000	-	160,000	-	180,000
Hexachlorobutadiene	-	79,000	-	79,000	-	89,000
Isopropyl benzene	27,000 J	79,000	25,000 J	79,000	10,000 J	89,000
p-isopropyltoluene	8,700 J	79,000	9,400 J	79,000	-	89,000
4-Methyl-2-pentanone (MIBK)	320,000	160,000	190,000	160,000	-	180,000
Methylene chloride	79,000 J	79,000	33,000 J	79,000	-	89,000
Naphthalene	67,000 J	160,000	62,000 J	160,000	46,000 J	180,000
n-Propyl benzene	73,000 J	79,000	69,000 J	79,000	30,000 J	89,000
Styrene	-	79,000	-	79,000	-	89,000
1,1,1,2-Tetrachloroethane	-	79,000	-	79,000	-	89,000
1,1,2,2-Tetrachloroethane	-	79,000	-	79,000	-	89,000
Tetrachloroethene	4,300,000	79,000	4,600,000	79,000	1,400,000	89,000
Toluene	4,100,000	79,000	3,700,000	79,000	790,000	89,000
1,2,3-Trichlorobenzene	-	79,000	-	79,000	-	89,000
1,2,4-Trichlorobenzene	-	79,000	7,800 J	79,000	-	89,000
1,1,1-Trichloroethane	850,000	79,000	580,000	79,000	85,000 J	89,000
1,1,2-Trichloroethane	11,000 J	79,000	-	79,000	-	89,000
Trichloroethene	5,500,000	79,000	4,700,000	79,000	710,000	89,000
Trichlorofluoromethane	-	160,000	-	160,000	-	180,000
1,2,3-Trichloropropane	-	79,000	-	79,000	-	89,000
1,2,4-Trimethylbenzene	300,000	79,000	280,000	79,000	130,000	89,000
1,3,5-Trimethylbenzene	97,000	79,000	96,000	79,000	44,000 J	89,000
Vinyl Acetate	-	160,000	-	160,000	-	180,000
Vinyl Chloride	-	160,000	-	160,000	-	180,000
o-xylene	800,000	79,000	690,000	79,000	250,000	89,000
m-xylene	2,800,000	79,000	2,400,000	79,000	920,000	89,000
p-xylene	-	79,000	-	79,000	-	89,000

DL Detection Limit
J Estimated Value
\- Non Detectable concentrations

2964_228

KIBER ENVIRONMENTAL SERVICES, INC.
GOLDER ASSOCIATES, INC.
216 PATERSON PLANK ROAD SITE

TABLE 38
Phase IV: Verification Testing
Summary of Total PCB Analyses - EPA Method 8082/325.2
(Control Samples)

ANALYTICAL PARAMETER	RESULTS (ug/kg)					
	Initial Control		Control - 3 Days		Final Control - 28 Days	
	Conc.	DL	Conc.	DL	Conc.	DL
I. TOTAL PCBs						
Aroclor-1016	-	260,000	-	26,000	-	26,000
Aroclor-1221	-	260,000	-	26,000	-	26,000
Aroclor-1232	-	260,000	-	26,000	-	26,000
Aroclor-1242	1,600,000	260,000	770,000	26,000	620,000	26,000
Aroclor-1248	-	260,000	-	26,000	-	26,000
Aroclor-1254	-	260,000	-	26,000	-	26,000
Aroclor-1260	-	260,000	-	26,000	-	26,000
II. ADDITIONAL ANALYSES						
Total Chloride (mg/kg)	2,700	1,300	5,500	1,300	8,500	230

DL Detection Limit
\- Non Detectable Concentrations

2964_229

APPENDIX B

GEOTECHNICAL REQUIREMENTS FOR EXCAVATION

OBJECTIVE: Perform Preliminary design analyses and prepare preliminary construction cost estimates for a temporary lateral support system to facilitate removal of "sludge" materials from the project site. In addition, the proposed support system would have to be designed to mitigate adverse impacts to existing slurry wall located adjacent to proposed excavation.

ASSUPMTIONS:

1. Proposed Excavation area is 70-ft wide by 85-ft long by 15-ft deep and temporary excavation support system will be constructed at excavation limits.
2. Existing grade is at approximately el. 11.41 ft (MSL).
3. Water table is at approximately el. 6 ft (MSL), or at 5.41 ft below ground surface (bgs). Therefore, assume groundwater table used for design is 5-ft bgs.
4. Design soil profile as shown on sheet 4 of 19.
5. Undrained shear strength conditions apply.
6. Proposed temporary lateral support system will not extend into the underlying varved clay.
7. The excavation will be dewatered (groundwater will be at the bottom depth of the excavation).

SOIL PROFILE: See Sheet 4 of 19

REFERENCES:

1. "Focused Feasibility Study, Investigation Report (Carlstadt)," Golder Associates, November 1997.
2. "Soil-Mechanics in Engineering Practice," 3rd edition, K. Terzaghi and R.B. Peck, and G. Mesci, 1996.
3. "Foundation Analysis and Design," 4th edition, J. Bowles, 1988.
4. "Foundation Engineering Handbook," H. Winterkorn and H. Fang, 1975
5. "Foundation Engineering,", 2nd edition, R.Peck, W.Hanson, T.Thornburn, 1974
6. "Manual of Steel Construction," 9th edition, AISC, 1998
7. "Foundations and Earth Structures," NAVFAC, DM 7.02, 1986
8. "Soil Mechanics," NAVFAC, DM 7.01, 1986
9. Design property charts for steel sheet piles, Skyline steel corporation

DISCUSSION: In order to limit the extent of excavation, a proposed temporary lateral support system will need to be installed at the limits of the proposed excavation. This temporary lateral support system would have to maintain a vertical profile, and it should be designed to withstand unbalanced hydrostatic earth pressures.

Given that the proposed temporary lateral support system cannot extend into or through the site's underlying varved clay, the proposed support system will have to consist of an internally "braced", multiple strut system.

Therefore, the proposed temporary lateral support system will include the following components:

1. Steel interlocking sheet piling with "AZ" type sections;
2. Steel walers to transfer loads; and
3. Steel "cross braced" struts.

As an alternate and if possible, steel "compression" walers could be utilized to deliver requisite loads to support system without the need for internal bracing. However, excavation plan areas would most likely have to be smaller than needed in order to utilize "compression" walers.

Lastly, Soil anchor tiebacks cannot be utilized on the project because they would interfere with the adjacent "slurry" walls and said tiebacks cannot penetrate the underlying varved clay deposit.

DESIGN: (See attached calculation sheets)

DESIGN CONCLUSIONS: These preliminary excavation support system calculations are only to be used to develop preliminary construction cost estimates. In general, these calculations establish somewhat conservative design, and do not include connection or welding calculations.

Final design of excavation support system must be completed by Contractor performing and/or installing the system. These calculations should not be considered as final or used by the contractor. Its likely that the contractor may have alternative methods to complete excavation and corresponding calculations should be submitted prior to construction.

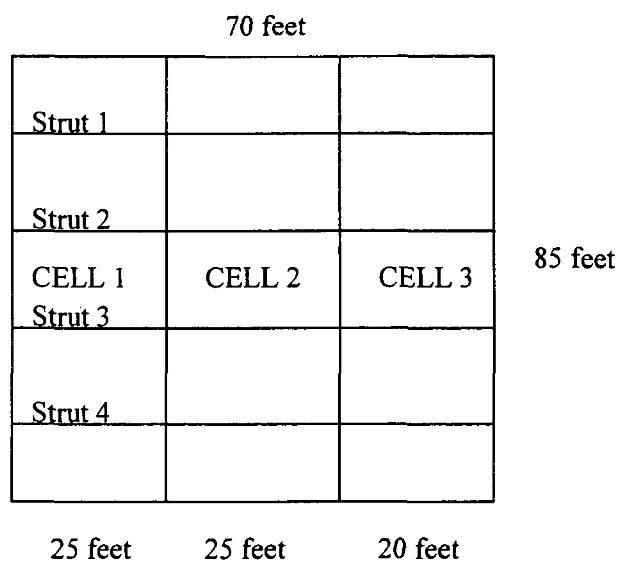
Based on preliminary calcs, the following design components could be utilized to provide temporary lateral support:

1. Use SZ-10 or SPZ-13 steel interlocking sheet pilling to establish a fairly water tight excavation perimeter.
2. Use a strut spacing of 15 feet center to center, and a maximum strut length of 26 feet.

3. Use W12 X 30 steel section as continuous wale to transfer loads from sheet piles to struts.
4. Use W10 X 45 steel section as struts, maximum strut length to 26 feet.
5. Provide 2 3inch X ¾ inch steel plate stiffeners on each side of the strut connection
6. Wale –strut connection and welding requirements to be specified
7. If warranted, contractor should provide capability to preload struts prior to excavation beneath strut level.

To facilitate the project's fairly large area (85 ft X 70 ft), the entire excavation will be divided into thirds or "cells". One cell would be excavated and backfilled, and after completed, the next "cell" would be excavated utilizing the common sheet pile wall section already in place.

Therefore, the proposed excavation sequence is as follows:

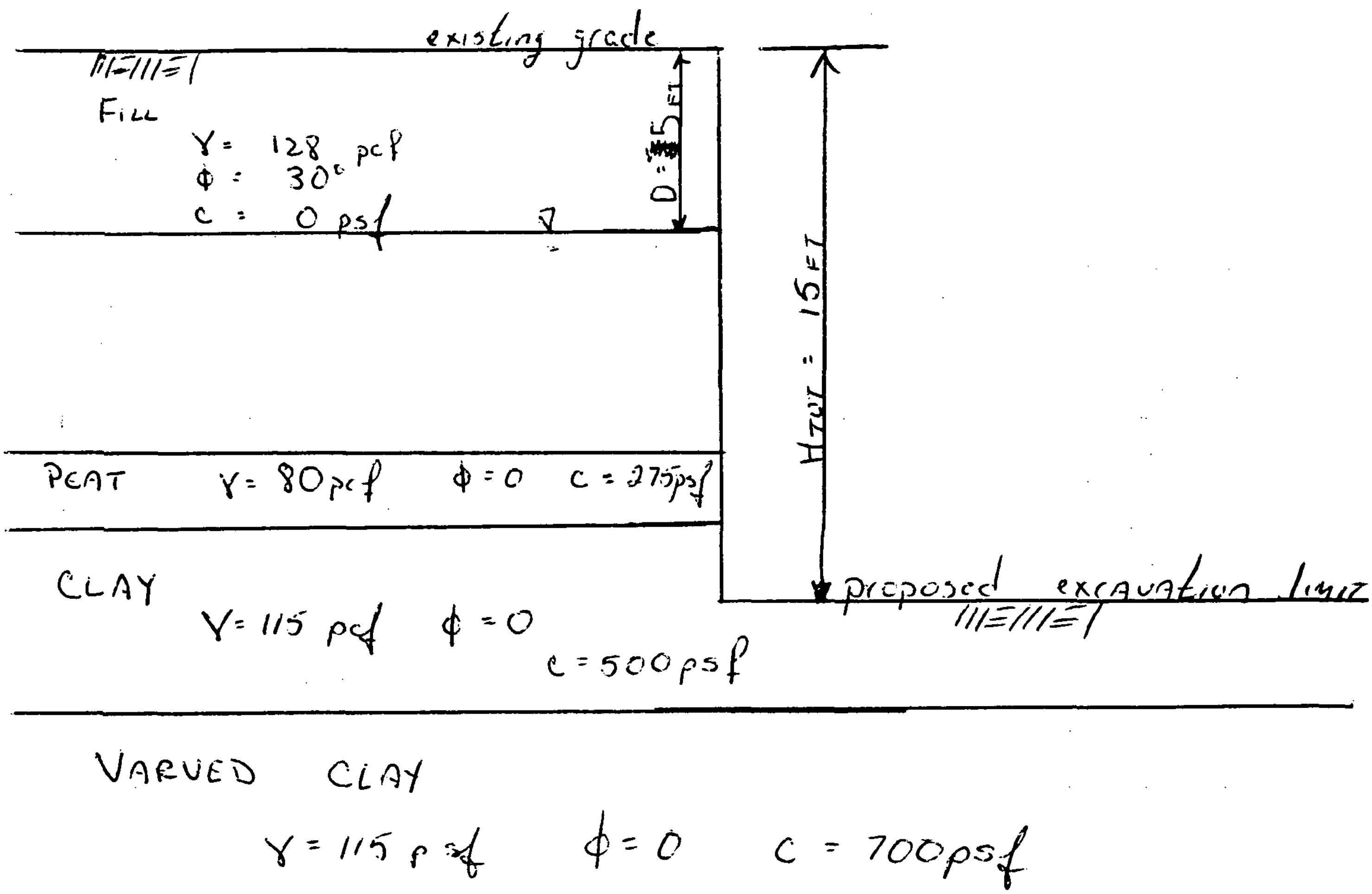


It will be assumed that sheetpile, wales, and struts from cell 1 can be used in Cells 2 and 3, accordingly. In addition, a 20% contingency will be applied to material costs to account for replacement of damaged materials.

Golder Associates

SUBJECT Preliminary Excavation Support Design		
Job No. 643 6222	Made by GLW	Date 04/8/01
Ref. CARLSTADT	Checked WFN	Sheet 4 of 19
	Reviewed WFN	

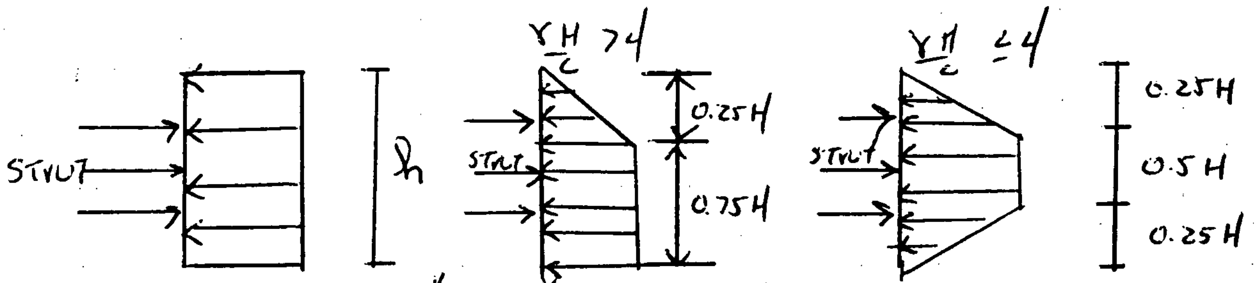
SOIL PROFILE:



Design

1) Apparent Earth Pressure Diagram:

Per "Soil Mechanics in Engineering Practice", 3rd Edition (1996), by K. Terzaghi, R. Peck, & G. Mesri, the following pressure diagrams can be utilized for sand & clay profiles:



$P_a = 0.65 K_a \gamma H$ $K_a = 1 - m\frac{4c}{\gamma H}$ $K_a \gamma H = P_a$ $0.2\gamma H - 0.4\gamma H = P_a$

(a) Sands   (b) Soft-med clays   (c) Stiff clays

Given that the upper 11 feet of proposed excavation will be ~~throughly~~ through fill, create an apparent earth pressure diagram assuming soil profile entirely "sand". To account for the peat/clay within bottom 4-FT of wall, the apparent earth pressure diagram will be increased proportionately.

2) Apparent Earth Pressure Diagram assuming Sandy Soil profile:

NOTE: Since dewatering excavation, use γ_{Boyant} below groundwater table so Don't Double count for hydrostatic effects.

use:

$\gamma_{TOTAL} = 128$ pcf $\phi = 30°$

$\gamma_{SAT} = 138$ pcf $c = 0$ psf

$\gamma_{BOY} = \gamma_{SAT} - \gamma_{wtr} = 138 \text{ pcf} - 62.4 \text{ pcf} = 75.6 \text{ pcf}$

$\therefore K_a = \tan^2(45 - \phi/2) = 0.333$

Using $H_1 = 5$ FT above gndwtr & $H_2 = 10$ ft below gndwtr

$P_a = 0.65 K_a \gamma_T H_1 + 0.65 K_a \gamma_B H_2$

$= 0.65(0.333)(128 \text{pcf})(5) + 0.65(0.333)(75.6\text{pcf})(10\text{FT})$

$= 138.5 \text{ pcf} + 163.63 \text{ pcf}$

$\therefore P_a \cong 302.1$ pcf say 303 pcf

3) Apparent Earth Pressure Diagram assuming Clayey Soil Profile:

USE:

$\gamma_{TOT} = 100$ pcf (Ave. value of Peat & Clay strata)

$\gamma_{SAT} = 115$ pcf (Ave value of Peat & clay strata)

$\gamma_B = \gamma_{SAT} - \gamma_w = 115 \text{ pcf} - 62.4 \text{ pcf} = 52.6 \text{ pcf}$

$\phi = 0$

$c \approx 400$ psf (Ave value of Peat & Clay strata

Check $\frac{\gamma H}{c} \leq 4$

a) Above gndwtr tbl $\gamma = 100 pcf$ $H_1 = 5 FT$ $c = 400 psf$

$$\frac{\gamma H_1}{c} = \frac{(100 pcf)(5)}{400 psf} = 1.25 \leq 4 \quad ok$$

b) Below gndwtr tabl $\gamma = 52.6 pcf$ $H_2 = 10$ $c = 400 psf$

$$\frac{\gamma_B H_2}{c} = \frac{(52.6 pcf)(10)}{400 psf} = 1.31 \leq 4 \quad ok$$

∴ Case (c) stiff clays from page of earth pressure diagram applies

$$P_a = 0.3\gamma_T H_1 + 0.3\gamma_B H_2$$
$$= 0.3(100 pcf)(5ft) + 0.3(52.6 pcf)(10ft)$$
$$= 150 psf + 157.8 psf$$

∴ $P_a \cong 307.8 psf$ use 308 psf

4) <u>Recommended Apparent Earth Pressure Diagram for Design:</u>

To Be Conservative, use a uniform apparent earth pressure diagram similiar to that shown for "sand" soil profile

However, increase pressure to 308 psf to account for presence of peat/clay

Also, include hydrostatic pressures, $P_w = \gamma_w H_2$
$= (62.4 pcf)(10 FT) = 624 psf$

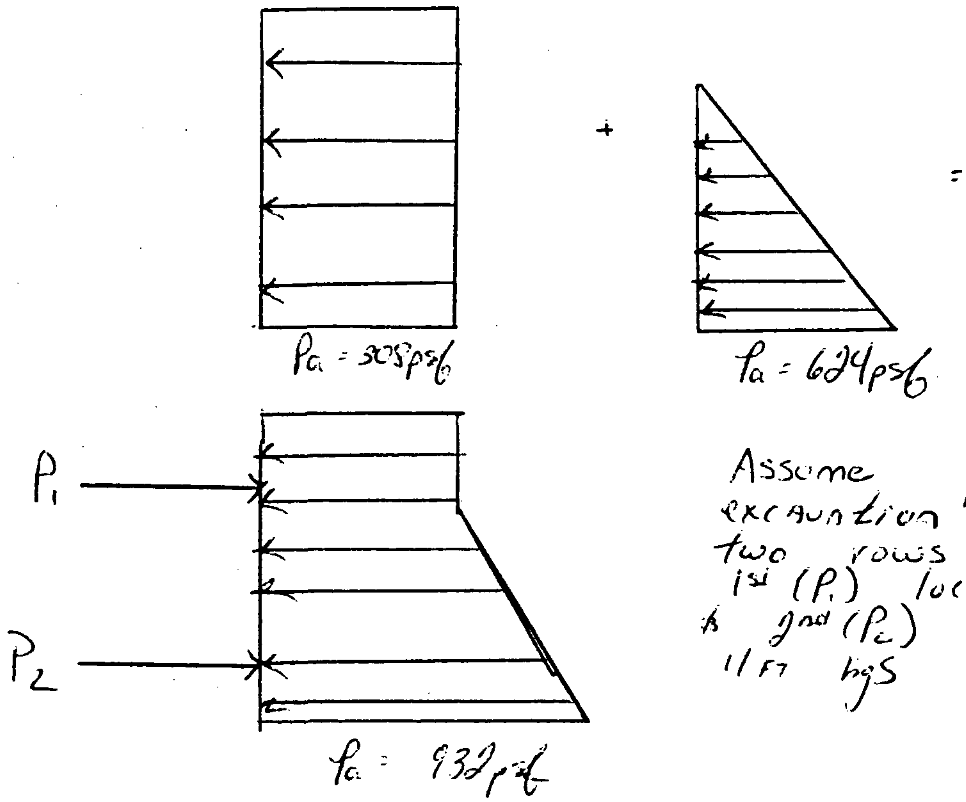
Total $P_a = P_{a soil} + P_{aw} = 308 psf + 624.0 psf$

∴ $P_a = 932.0 psf$

400173

Golder Associates	SUBJECT Preliminary Excavation Support Design		
	Job No. 013 6222 Ref. CARLSTADT	Made by GLL Checked MFM Reviewed MFM	Date 04/18/01 Sheet 8 of 19

Therefore, the following earth pressure diagram will be used to perform preliminary design calculations:



Assume proposed excavation will have two rows of struts 1st (P_1) located @ 4 ft bgs & 2nd (P_2) located @ 11 ft bgs

NOTE: System CANNOT be cantilevered based on previous calculation performed on 03/06/01.

A copy of this calc can be provided if requested

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5) Check Base Stability of Braced Cut:

Base of excavation will be in clay, therefore model analysis as of cut entirely in clay

$\gamma_T = 115$ pcf

$c = 500$ psf

$$F_S = \frac{5.7\,S_u}{H(B'\gamma - S_u)/B'}$$

Assume width of Excavation ≤ 25 FT

$B' \leq B\sqrt{2}$

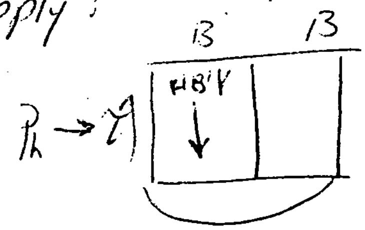
∴ $B = 25$ FT

$$F_S = \frac{(5.7)(500)}{(15)[(25)\sqrt{2}(115) - 500]\,/\,25\sqrt{2}} = 1.88 > 1.5 \text{ ok}$$

∴ FS = 1.88 which is > than 1.5 (Indust. standard)

NOTE: This analysis excludes friction / adhesion on back of sheeting, and clay is assumed to have uniform shear strength throughout failure ZONE.

However, given that fill overlies clay stratum, the following eqn would apply:



$\tau = P_h \tan\phi\, H$

$P_h = \frac{1}{2}(1-\sin\phi)\gamma H^2$

$$FS = \frac{5.7\,S_u}{(B' H \gamma_{FILL} - P_h \tan\phi\, H)/B'}$$

Assume B = 25 FT ∴ $B' = 25(\sqrt{2}) \cong 35.4$

∴ $B' \cong 35$ FEET

$B' H \gamma_{fill}$ = Surcharge = $(35)(15)(128) = 67200$ plf

Assume $\phi_{fill} = 30°$ $\quad \tan\phi = 0.577$

$\sigma_h' = (1 - \sin\phi')\gamma z = 0.5\gamma z = (0.5)(128)(15) = 960$ psf

$P_h = \frac{1}{2}\sigma_h H = \frac{1}{2}(960)(15) = 7200$ plf

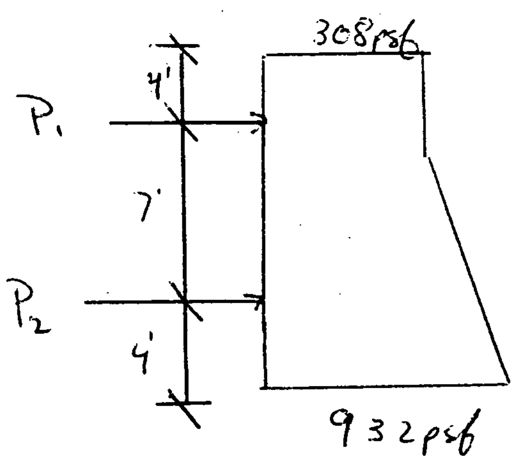
$P_h \tan\phi \, H = (7200)(\tan\phi)(15) \simeq 62354$ plf

$$\therefore FS = \frac{(5.7)(1500)}{(67200 - 62354)/35} = 20.6 >> 1.5 \text{ ok}$$

System ok for STABILITY

6) Estimated Strut Forces

Using Apparent Earth Pressure Diagram (see pg 8) & strut layout, we get the following strut forces



Solve for:

$P_1 = 2505$ lbs/LF

$P_2 = 5235$ lbs/LF

$P_{ave} = 3870$ lb/LF

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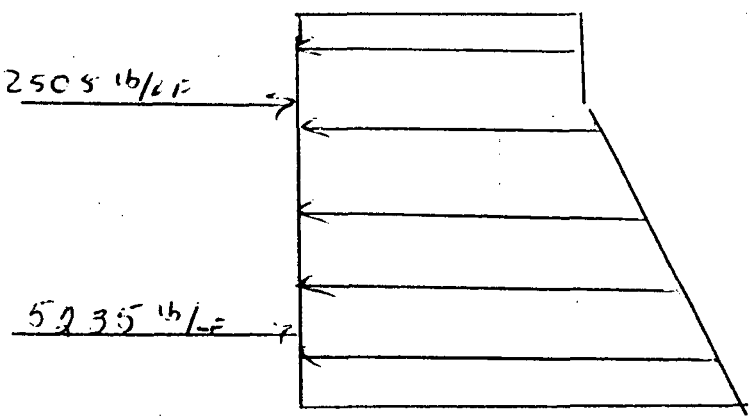
STRUT FORCE:

Use P_{max} = 5235 lb/LF @ 15 FT

Assume struts spread @ 15-FT (MAX) plan intervals

$\therefore P_{max}$ = 39.3 tons



P_{AVE} = 3870 lb/LF

400177

Golder Associates	SUBJECT PRELIMINARY EXCAVATION SUPPORT DESIGN		
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7) DETERMINE SIZE of SHEET PILE WALL:

CANTILEVER Moments: Assume fixity @ strut supports

$$(M_{max})_{CANT} = (4)(\cancel{618.67}\ 580.0)(4/2) = \cancel{4950}\ 4640 \ \frac{ft\text{-}lbs}{LF\,WALL}$$

CENTRAL Moment

$$(M_{max})_{CNTRL} = \left(4 + 7/2\right)^2 (618.67)\left(\tfrac{1}{2}\right) - (4640)\left(\tfrac{7}{2}\right)$$

$$\cong \underline{1160 \ ft\text{-}lb/LF\,WALL}$$

$\therefore$ Use $M_{max} = 4950$ ft-lbs / LF WALL

Assume GRADE 50 ($F_y = 50$ ksi) steel

Therefore:

$$f_b = 0.66 F_y = 33 \text{ Ksi}$$

$$\therefore (S_{req})_{SHT} = \cancel{3.6 \text{ kip ft}} \quad \frac{(4.95 \text{ Kip-FT})(12)}{33}$$

$$\therefore \underline{(S_{req})_{SHT} = 1.8 \text{ IN}^3/ft}$$

USE STEEL SHEET PILE WALL Sect with min. section Modulus of 1.8 in³/FT

USE "SZ-10" Sheet Pile Sections

$\therefore$ $w = 10.5$ lbs/SF of WALL $\quad S = 6.6$ in³/ft > 1.8 ∴ OK

CAN Also use "SPZ-13" $w = 13$ lb/FT² $\quad S = 10.3$ in³/FT

400178

8) Design Wales and Struts

Load on wales = ~~4950~~ 4640 MFM ft-lb/LF wall

$(M_{max})_{wale\ 15FT} = \frac{1}{12} w L^2 = \frac{1}{12}(\cancel{4.950}\ 4.640)(15)^2 = \cancel{92.8}\ 87$ kip-ft/LF MFM

$(S_{req'd})_{wale\ 15FT} = \frac{(\cancel{92.8}\ 87)(12)}{33} = \cancel{33.7}\ 31.6$ MFM in^3/LF

W = 5235.0 $M_{max} \approx 98$ kip-ft/LF or $S_{req} = 35.7\ in^3/LF$

∴ Use W12 x 30 lbs/LF ~~(S_{W12x31} = 45.6 in³; w = 35 lb/LF)~~

(S_{W12x30} = 38.6 in³; w = 30 lb/LF)

Loads on Struts. 38.6 > 31.6 & 35.7 ok MFM

∴ $P_{strut} = (4950)(15)\frac{1}{2} = \cancel{37.12}\ 34.8$ tons MFM or ~~74.3~~ 69.6 kips MFM

Assume KL = 26 feet & P = (5235)(15)/2000 = 39.3 tons MFM

∴ use W10 x 45 STRUTS

Pallow = 82 kips > ~~74.3~~ kips ok!

69.6 K & 78.5 K MFM

Design Bearing Stiffness

Provide Area ~~Design~~ stiffness plus area web of whole equal to area strut

Strut Area = 13.3 in²

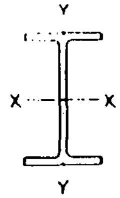
Wale Web = 10 x (3/8) = 3.75 in²

Area stiffness = 9.55 in² ∴ use 2 - 3 in x 3/4 in Plate each side Area = 10 in²

400179

F_y = 36 ksi
F_y = 50 ksi

COLUMNS
W shapes
Allowable axial loads in kips

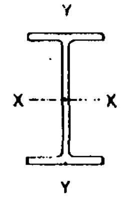


Designation		W10											
Wt./ft		60		54		49		45		39		33	
F_y		36	50	36	50	36	50	36	50	36	50	36	50
Effective length in ft *KL* with respect to least radius of gyration r_y	0	380	528	341	474	311	432	287	399	248	345	210	291
	6	353	482	317	433	289	394	260	351	224	303	189	255
	7	348	472	312	423	284	385	253	340	218	293	184	246
	8	341	461	306	414	279	376	247	328	213	283	179	237
	9	335	450	300	403	273	367	240	316	206	272	173	228
	10	328	437	294	392	268	357	232	303	200	260	167	217
	11	321	425	288	381	262	346	224	289	193	248	161	207
	12	313	412	281	369	256	335	216	274	186	235	155	196
	13	306	398	274	356	249	324	208	259	178	221	149	184
	14	297	383	267	343	242	312	199	243	170	207	142	171
	15	289	368	259	330	235	299	190	227	162	193	135	159
	16	280	353	251	316	228	286	180	209	154	177	127	145
	17	271	337	243	301	221	273	170	191	145	161	120	131
	18	262	320	235	286	213	259	160	172	136	144	112	117
	19	253	303	226	271	205	245	149	154	126	130	103	105
	20	243	285	217	255	197	230	138	139	116	117	95	95
	22	222	248	199	221	180	198	115	115	97	97	78	78
	24	201	209	179	186	161	167	97	97	81	81	66	66
	26	177	178	158	159	142	143	82	$\boxed{82}$	69	69	56	56
	28	154	154	137	137	123	123	71	71	60	60	48	48
	30	134	134	119	119	107	107	62	62	52	52	42	42
	32	118	118	105	105	94	94	54	54	46	46	37	37
	33	111	111	99	99	88	88	51	51	43	43		
	34	104	104	93	93	83	83						
	36	93	93	83	83	74	74						
Properties													
U		2.55	2.55	2.56	2.56	2.57	2.57	3.25	3.25	3.28	3.28	3.35	3.35
P_{wo} (kips)		99	138	83	116	73	101	79	109	64	89	55	77
P_{wi} (kips/in.)		15	21	13	19	12	17	13	18	11	16	10	15
P_{wb} (kips)		239	282	163	193	127	149	138	163	101	119	79	93
P_{fb} (kips)		104	145	85	118	71	98	86	120	63	88	43	59
L_c (ft)		10.6	9.0	10.6	9.0	10.6	9.0	8.5	7.2	8.4	7.2	8.4	7.1
L_u (ft)		31.1	22.4	28.2	20.3	26.0	18.7	22.8	16.4	19.8	14.2	16.5	11.9
A (in.^{2})		17.6		15.8		14.4		13.3		11.5		9.71	
I_x (in.^{4})		341		303		272		248		209		170	
I_y (in.^{4})		116		103		93.4		53.4		45.0		36.6	
r_y (in.)		2.57		2.56		2.54		2.01		1.98		1.94	
Ratio r_x/r_y		1.71		1.71		1.71		2.15		2.16		2.16	
B_x Bending factors		0.264		0.263		0.264		0.271		0.273		0.277	
B_y Bending factors		0.765		0.767		0.770		1.000		1.018		1.055	
$a_x/10^6$		50.5		45.0		40.6		37.2		31.2		25.4	
$a_y/10^6$		17.3		15.4		13.8		8.0		6.7		5.4	
$F'_{ex}(K_xL_x)^2/10^2$ (kips)		200		198		196		194		189		182	
$F'_{ey}(K_yL_y)^2/10^2$ (kips)		68.5		68.0		66.9		41.9		40.7		39.0	

Note: Heavy line indicates *Kl/r* of 200.

F_y – 36 ksi
F_y = 50 ksi

COLUMNS
W shapes
Allowable axial loads in kips



Designation		W8											
Wt./ft		67		58		48		40		35		31	
F_y		36	50	36	50	36	50	36	50	36	50	36	50
Effective length in ft *KL* with respect to least radius of gyration r_y	0	426	591	369	513	305	423	253	351	222	309	197	274
	6	387	525	336	455	276	375	229	310	201	272	178	241
	7	379	510	328	442	270	363	223	300	197	264	174	234
	8	370	494	320	428	263	352	218	290	191	255	170	226
	9	360	477	312	413	256	339	212	279	186	246	165	217
	10	350	459	303	397	249	326	205	268	180	238	160	208
	11	339	440	293	380	241	312	199	256	174	225	154	199
	12	328	420	283	363	233	297	192	244	168	214	149	189
	13	316	399	273	344	224	282	184	231	162	202	143	179
	14	304	378	263	325	215	266	177	217	155	190	137	168
	15	292	355	251	305	206	249	169	203	148	177	131	156
	16	279	331	240	284	196	232	160	188	141	164	124	145
	17	265	307	228	263	186	214	152	172	133	150	117	132
	18	251	281	216	240	176	195	143	156	125	136	110	119
	19	236	254	203	217	165	175	134	140	117	122	103	107
	20	221	230	190	196	154	158	124	126	109	110	95	97
	22	190	190	162	162	131	131	104	104	91	91	80	80
	24	159	159	136	136	110	110	88	88	76	76	67	67
	26	136	136	116	116	94	94	75	75	65	65	57	57
	28	117	117	100	100	81	81	64	64	56	56	49	49
	30	102	102	87	87	70	70	56	56	49	49	43	43
	32	90	90	76	76	62	62	49	49	43	43	38	38
	33	84	84	72	72	58	58	46	46	40	40	35	35
	34	79	79	68	68	55	55	44	44				
	35	75	75	64	64								
Properties													
U		2.48	2.48	2.50	2.50	2.54	2.54	2.56	2.56	2.59	2.59	2.61	2.61
P_{wo} (kips)		147	205	120	167	86	119	69	96	56	78	48	67
P_{wi} (kips/in.)		21	29	18	26	14	20	13	18	11	16	10	14
P_{wb} (kips)		744	877	533	628	257	303	187	221	120	141	93	110
P_{fb} (kips)		197	273	148	205	106	147	71	98	55	77	43	59
L_c (ft)		8.7	7.4	8.7	7.4	8.6	7.3	8.5	7.2	8.5	7.2	8.4	7.2
L_u (ft)		39.9	28.7	35.3	25.4	30.3	21.8	25.3	18.2	22.6	16.3	20.1	14.5
A (in.^{2})		19.7		17.1		14.1		11.7		10.3		9.13	
I_x (in.^{4})		272		228		184		146		127		110	
I_y (in.^{4})		88.6		75.1		60.9		49.1		42.6		37.1	
r_y (in.)		2.12		2.10		2.08		2.04		2.03		2.02	
Ratio r_x/r_y		1.75		1.74		1.74		1.73		1.73		1.72	
B_x Bending factors		0.326		0.329		0.326		0.330		0.330		0.332	
B_y Bending factors		0.921		0.934		0.940		0.959		0.972		0.985	
$a_x/10^6$		40.6		33.9		27.4		21.7		18.9		16.4	
$a_y/10^6$		13.2		11.2		9.1		7.3		6.3		5.6	
$F'_{ex}(K_xL_x)^2/10^2$ (kips)		144		138		135		129		128		125	
$F'_{ey}(K_yL_y)^2/10^2$ (kips)		46.6		45.7		44.9		43.2		42.7		42.3	

Note: Heavy line indicates *Kl/r* of 200

Golder Associates	SUBJECT Preliminary Excavation Support Design		
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COST ESTIMATE:

a) use $900/ton of steel for materials costs delivered to the site

∴ wgt steel sheet piles = (15 FT)(13 lb/FT²)[(85+85) + (25+25)]
= 42900 lbs

∴ 21.45 tons = wt of sheet piles

weight of wales = (30)(85+85+25+25)(2)
= 13200 lbs

∴ 6.60 tons = wt. of wales

wght of struts = (45)(25)(2)(4)
= 9000 lbs

∴ 4.5 tons = wt of struts

Total wght of STEEL = 21.45 tons + 6.60 tons + 4.5 tons
≈ 33 tons

20% = 6.5 tons

total weight = 39.5 tons

∴ say 40 tons

Material Costs ($900/ton) = (40 tons)($900/ton)
= $36,000

b) INSTALLATION Costs:

Cost to install sheet pile = \$12 to \$15/SF (includes removal) (use \$15/SF)

Cost to install wales/struts = \$18 to \$20/SF (use \$20/SF)

- Install Cost Cell #1:

LF Wale = (85 + 85 + 25 + 25) (2) = 440 LF

SF Sheet = (15)(85+85+25+25) = 3300 SF

LF STRUTS = (2)(4)(25) = 200 LF

Install Costs Cell # 1 = (440 + 200)(20) + (3300)(15)

∴ = \$62,300

- Install Cost Cell #2:

Install Costs for wales/struts are same as Cell #1

Install Costs of sheeting is less because common wall is not removed & is reused with Cell #2

SF sheeting = (15)(85 + 25 + 25) = 2025 SF

Install Costs Cell #2 = (440 + 200)(20) + (2025)(15)

∴ \$43,175

Golder Associates	SUBJECT Preliminary Excavation Support Design		
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- Install Costs for Cell # 3

LF Wales = [(85 + 85) + (20 + 20)]2 = 420 LF
LF Struts = (4)(20)(2) = 160 LF
SF Sheeting = (15)(85 + 20 + 20) = 1875 SF

Install Costs Cell # 3 = (420 + 160)(20) + (1875)(15)

∴ $39,725

- Installation Subtotal

Cell # 1 =	$62,300
Cell # 2 =	$43,175
Cell # 3 =	$39,725
Subtotal	$145,200

Assume Cost Premium of 50% to account for Level B HAZMAT labor

∴ Total Installation Cost = (1.50)($145,200)

∴ $217,800

Golder Associates	SUBJECT Preliminary Excavation Support Design		
	Job No. ~~003~~ 9434227	Made by CLL	Date 04/18/01
	Ref. CARLSTADT	Checked MFN / Reviewed MFN	Sheet 18 of 19

Cost Summary:

1) Material Costs = $36,000 [includes 20% contingency for damaged/replaced materials]

2) Install Costs = $217,800 [includes 50% contingency for Level B HAZ MAT worker]

Subtotal = $253,800

3) Assume Contractor Admin, Management, supervision equals 10% Construction Cost. therefore,

Contract Admin/Mgt = $25,380

4) Assume Contractor Profit equals 10% Construct Cost

Contract Profit = $25,380

5) Total Costs $304,560

Note: Over all Contingency Included in Project Cost estimate Not shown here

∴ $305,000 - Total Cost

Note: These costs include material, labor, equipment costs for only the installation & removal of proposed temporary lateral support system. No allowances were made for off-site disposal of materials as Hazardous in Nature. In addition Costs for excavation, backfilling, instrumentation are excluded.

400184

Golder Associates		
SUBJECT Preliminary Excavation Support Design		
Job No. 943-6222 Ref. CALC START	Made by GLL Checked WFM Reviewed WFM	Date 01/10/01 Sheet 19 of 19

NOTE:

If sheeting from Cell #1 can't be used in Cell #2 & 3 accordingly, then the costs herein must be increased by upwards of $70,000 to account for additional materials

THESE CALCS are preliminary design calcs/costs and should be considered fairly conservative, but realistic construction costs.

APPENDIX C

AIR EMISSIONS DURING EXCAVATION

AIR EMISSIONS DURING EXCAVATION

1.0 TSCREEN EMISSION MODELING

Maximum emission rates for each VOC constituent detected during the FFSI were calculated using the EPA TSCREEN model (MCB#7 – dated 95260). The input parameters for this model included the following:

- Initial Form of Release – Superfund Release Type
- Superfund Release Type – Soil Excavation
- Vapor Pressure – Unique to each constituent
- Concentration of Contaminated Soil – Maximum concentration or 95% Upper Confidence Level based on the data set collected during the FFSI (see Appendix D, Table D-1)
- Volume of Soil Excavated – 625 Cubic Meters (approximately 1/3 of the total excavation of 25.9 meters x 19.8 meters x 3.66 meters deep)
- Exposed Surface Area of Contaminated Soil – 171 Square Meters (approximately 1/3 of the total excavation area)
- Bulk Density of Soil – 1.52 grams per cubic centimeter (data collected from the FFS Treatability Study)
- Excavation Time – 360 Hours (Assumed 15 days per excavated cell)

A summary of the calculated maximum emission rates for each constituent is provided in Table C-1 and the model runs for each constituent are provided in Attachment C-1.

2.0 ISCST3 DISPERSION MODELING

Based on the calculated emission rates, concentrations at various receptors were established using dispersion modeling.

The procedure used in the dispersion analysis followed the recommendations in the U.S. Environmental Protection Agency's (USEPA's) modeling guidelines, which are approved by the New Jersey Department of Environmental Protection (NJDEP) for general use. The recommendations are related to specific models and options that are preferred for use in particular situations. The guidelines provide recommendations for predicting impacts in both flat or gently rolling terrain by the use of simple terrain models (i.e., terrain less than emission height). These models are applicable to the 216 Paterson Plank Road Site (Site).

The Industrial Source Complex Short-Term Dispersion Model, Version 00101, (ISCST3; USEPA, 1999) is preferred because USEPA and NJDEP have specifically recommended this model to provide refined air quality impacts in simple terrain. The ISCST3 model is a Gaussian plume model that can be used to assess the air quality impact of emissions from a wide variety of sources associated with an industrial facility.

The ISCST3 model is designed to calculate hour-by-hour concentrations or deposition values and to provide averages for time periods of 2, 3, 4, 6, 8, 12, and 24 hours and 1 year. The ISCST3 model has rural and urban options that affect the wind speed profile exponent law, dispersion rates, and mixing-height formulations used in calculating ground-level concentrations.

The ISCST3 model was used to evaluate the air quality impacts of various volatile organic compound (VOC) constituents at different distances during excavation of the sludge material. Because it is anticipated that the actual excavation would take place for only one-third of the total sludge area at any given time, one-third of the total area was assumed as an area source in the ISCST3 air modeling analysis.

Meteorological data used in the ISCST3 model to determine air quality impacts consisted of 5 years of coincident hourly surface weather observations and twice-daily upper-air soundings from the National Weather Service (NWS) station at Newark International Airport and the Flight Service Station at Atlantic City Airport, respectively. The 5-year period of meteorological data was from 1987 through 1991.

The ISCST3 model was run for emissions of vinyl chloride at 58 ppm (based on the TSCREEN results) for each of the five years of meteorological data to determine the maximum average concentrations that could be anticipated during excavation. General input parameters are summarized below and the results of the ISCST3 model are provided in Attachment C-2:

- Polar Cartesian coordinate systems for receptor locations;
- Urban option;
- Single emission source;
- Area source simulation;
- Concentration estimates for 8-hour average time; and,
- USEPA regulatory default option.

The maximum average 8-hour concentration detected over the five year period for vinyl chloride was then used to predict the maximum average 8-hour concentration for the other VOCs using the ratio of the emission rates for each constituent (refer to Table C-1).

Potential receptors were considered at 25-m spacing along the facility fence line and at distances beyond the fence line of 75, 100, 150m, and at 100-m intervals from 200 to 1,000m.

g:\projects\943-6222\ffs\revised ffs\air modeling\air.report.doc

Table C-1
Maximum Predicted Contaminant Concentration
at the Fence Line
216 Paterson Plank Road Site
Carlstadt, New Jersey

Contaminant	Maximum Emission Rate ($g/s/m^2$)	Concentration 8-hour Average (ug/m^3)	Concentration 8-hour Average (ppm)
Vinyl Chloride (58 ppm)	0.017521	59,081	23.08
Benzene (59 ppm)	0.000524	1,767	0.55
2-Butanone (281 ppm)	0.000545	1,838	0.62
Chlorobenzene (1,200 ppm)	0.000063	212	0.05
Chloroform (210 ppm)	0.001118	3,770	0.77
1,1-Dichloroethane (147 ppm)	0.001271	4,286	1.06
Total 1,2-Dichloroethene (49 ppm)	0.001554	5,240	1.32
1,2-Dichloroethane (47 ppm)	0.000447	1,507	0.37
Ethylbenzene (1,100 ppm)	0.000049	165	0.04
Methylene Chloride (450 ppm)	0.002445	8,245	2.38
4-Methyl-2-Pentanone (470 ppm)	0.000112	378	0.09
1,1,1-Trichloroethane (2,700 ppm)	0.000699	2,357	0.43
Tetrachloroethene (6,416 ppm)	0.000098	330	0.05
Toluene (5,619 ppm)	0.000147	496	0.13
Trichloroethene (7,044 ppm)	0.000405	1,366	0.25
Total Xylenes (5,565 ppm)	0.000063	212	0.05

Note:
(1) Maximum emission rate from TSCREEN modeling.
(2) Maximum average concentrations predicted using urban mode dispersion in ISCST3 model with 5 years of surface and upper air meteorological data from Newark/Atlantic City airports, respectively.

ATTACHMENT C-1

TSCREEN MODEL OUTPUT

04/17/01
07:49:15

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - Benzene

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.524000E-03
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	13.0767
LENGTH OF SMALLER SIDE (M)	=	13.0767
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	6522.	2.045954	15.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****
*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	6522.	6	1.0	1.0	10000.0	.00	45.
100.	335.3	6	1.0	1.0	10000.0	.00	39.
200.	94.55	6	1.0	1.0	10000.0	.00	36.
300.	45.57	6	1.0	1.0	10000.0	.00	2.
400.	27.47	6	1.0	1.0	10000.0	.00	24.
500.	18.72	6	1.0	1.0	10000.0	.00	28.
600.	13.78	6	1.0	1.0	10000.0	.00	6.
700.	10.69	6	1.0	1.0	10000.0	.00	1.
800.	8.610	6	1.0	1.0	10000.0	.00	9.
900.	7.137	6	1.0	1.0	10000.0	.00	11.
1000.	6.049	6	1.0	1.0	10000.0	.00	35.
1100.	5.220	6	1.0	1.0	10000.0	.00	12.
1200.	4.571	6	1.0	1.0	10000.0	.00	29.
1300.	4.052	6	1.0	1.0	10000.0	.00	29.
1400.	3.628	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	3.277	6	1.0	1.0	10000.0	.00	29.
1600.	2.983	6	1.0	1.0	10000.0	.00	12.
1700.	2.732	6	1.0	1.0	10000.0	.00	29.
1800.	2.518	6	1.0	1.0	10000.0	.00	12.
1900.	2.332	6	1.0	1.0	10000.0	.00	20.
2000.	2.169	6	1.0	1.0	10000.0	.00	29.
2100.	2.026	6	1.0	1.0	10000.0	.00	43.
2200.	1.900	6	1.0	1.0	10000.0	.00	41.
2300.	1.787	6	1.0	1.0	10000.0	.00	41.
2400.	1.686	6	1.0	1.0	10000.0	.00	43.
2500.	1.595	6	1.0	1.0	10000.0	.00	43.
2600.	1.512	6	1.0	1.0	10000.0	.00	43.
2700.	1.438	6	1.0	1.0	10000.0	.00	41.
2800.	1.369	6	1.0	1.0	10000.0	.00	41.
2900.	1.307	6	1.0	1.0	10000.0	.00	43.
3000.	1.250	6	1.0	1.0	10000.0	.00	43.
3500.	1.022	6	1.0	1.0	10000.0	.00	43.
4000.	.8622	6	1.0	1.0	10000.0	.00	43.
4500.	.7439	6	1.0	1.0	10000.0	.00	5.
5000.	.6532	6	1.0	1.0	10000.0	.00	5.
5500.	.5816	6	1.0	1.0	10000.0	.00	5.
6000.	.5238	6	1.0	1.0	10000.0	.00	5.
6500.	.4761	6	1.0	1.0	10000.0	.00	5.
7000.	.4363	6	1.0	1.0	10000.0	.00	5.
7500.	.4024	6	1.0	1.0	10000.0	.00	5.
8000.	.3733	6	1.0	1.0	10000.0	.00	31.
8500.	.3481	6	1.0	1.0	10000.0	.00	39.
9000.	.3261	6	1.0	1.0	10000.0	.00	39.
9500.	.3066	6	1.0	1.0	10000.0	.00	39.
10000.	.2892	6	1.0	1.0	10000.0	.00	39.
15000.	.1843	6	1.0	1.0	10000.0	.00	39.
20000.	.1351	6	1.0	1.0	10000.0	.00	26.
25000.	.1065	6	1.0	1.0	10000.0	.00	26.
30000.	.8789E-01	6	1.0	1.0	10000.0	.00	26.
40000.	.6513E-01	6	1.0	1.0	10000.0	.00	44.
50000.	.5171E-01	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	6522.	6	1.0	1.0	10000.0	.00	45.

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR MAXIMUM CONCENTRATION

****
*** END OF SCREEN MODEL OUTPUT ***
****

04/17/01
07:57:04

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - 2-Butanone

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.545000E-03
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	13.0767
LENGTH OF SMALLER SIDE (M)	=	13.0767
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	6783.	2.304903	15.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****
*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	6783.	6	1.0	1.0	10000.0	.00	45.
100.	348.7	6	1.0	1.0	10000.0	.00	39.
200.	98.34	6	1.0	1.0	10000.0	.00	36.
300.	47.40	6	1.0	1.0	10000.0	.00	2.
400.	28.57	6	1.0	1.0	10000.0	.00	24.
500.	19.47	6	1.0	1.0	10000.0	.00	28.
600.	14.33	6	1.0	1.0	10000.0	.00	6.
700.	11.12	6	1.0	1.0	10000.0	.00	1.
800.	8.955	6	1.0	1.0	10000.0	.00	9.
900.	7.423	6	1.0	1.0	10000.0	.00	11.
1000.	6.292	6	1.0	1.0	10000.0	.00	35.
1100.	5.430	6	1.0	1.0	10000.0	.00	12.
1200.	4.754	6	1.0	1.0	10000.0	.00	29.
1300.	4.214	6	1.0	1.0	10000.0	.00	29.
1400.	3.773	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	3.409	6	1.0	1.0	10000.0	.00	29.
1600.	3.102	6	1.0	1.0	10000.0	.00	12.
1700.	2.842	6	1.0	1.0	10000.0	.00	29.
1800.	2.619	6	1.0	1.0	10000.0	.00	12.
1900.	2.425	6	1.0	1.0	10000.0	.00	20.
2000.	2.256	6	1.0	1.0	10000.0	.00	29.
2100.	2.107	6	1.0	1.0	10000.0	.00	43.
2200.	1.976	6	1.0	1.0	10000.0	.00	41.
2300.	1.858	6	1.0	1.0	10000.0	.00	41.
2400.	1.753	6	1.0	1.0	10000.0	.00	43.
2500.	1.659	6	1.0	1.0	10000.0	.00	43.
2600.	1.573	6	1.0	1.0	10000.0	.00	43.
2700.	1.495	6	1.0	1.0	10000.0	.00	41.
2800.	1.424	6	1.0	1.0	10000.0	.00	41.
2900.	1.359	6	1.0	1.0	10000.0	.00	43.
3000.	1.300	6	1.0	1.0	10000.0	.00	43.
3500.	1.063	6	1.0	1.0	10000.0	.00	43.
4000.	.8968	6	1.0	1.0	10000.0	.00	43.
4500.	.7737	6	1.0	1.0	10000.0	.00	5.
5000.	.6793	6	1.0	1.0	10000.0	.00	5.
5500.	.6049	6	1.0	1.0	10000.0	.00	5.
6000.	.5448	6	1.0	1.0	10000.0	.00	5.
6500.	.4952	6	1.0	1.0	10000.0	.00	5.
7000.	.4537	6	1.0	1.0	10000.0	.00	5.
7500.	.4185	6	1.0	1.0	10000.0	.00	5.
8000.	.3883	6	1.0	1.0	10000.0	.00	31.
8500.	.3621	6	1.0	1.0	10000.0	.00	39.
9000.	.3391	6	1.0	1.0	10000.0	.00	39.
9500.	.3188	6	1.0	1.0	10000.0	.00	39.
10000.	.3008	6	1.0	1.0	10000.0	.00	39.
15000.	.1917	6	1.0	1.0	10000.0	.00	39.
20000.	.1405	6	1.0	1.0	10000.0	.00	26.
25000.	.1108	6	1.0	1.0	10000.0	.00	26.
30000.	.9141E-01	6	1.0	1.0	10000.0	.00	26.
40000.	.6774E-01	6	1.0	1.0	10000.0	.00	44.
50000.	.5379E-01	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	6783.	6	1.0	1.0	10000.0	.00	45.

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR MAXIMUM CONCENTRATION

****
*** END OF SCREEN MODEL OUTPUT ***
****

04/17/01
07:58:21

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - Chlorobenzene

```
SIMPLE TERRAIN INPUTS:
   SOURCE TYPE                    =        AREA
   EMISSION RATE (G/(S-M**2))     =      .630000E-04
   SOURCE HEIGHT (M)              =         .0000
   LENGTH OF LARGER SIDE (M)      =      13.0767
   LENGTH OF SMALLER SIDE (M)     =      13.0767
   RECEPTOR HEIGHT (M)            =         .0000
   URBAN/RURAL OPTION             =        URBAN
   MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

      ****************************************
      *** SUMMARY OF SCREEN MODEL RESULTS ***
      ****************************************
```

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	784.1	0.170608	15.	0.

```
***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************

BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =     .000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************
*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	784.1	6	1.0	1.0	10000.0	.00	45.
100.	40.31	6	1.0	1.0	10000.0	.00	39.
200.	11.37	6	1.0	1.0	10000.0	.00	36.
300.	5.479	6	1.0	1.0	10000.0	.00	2.
400.	3.303	6	1.0	1.0	10000.0	.00	24.
500.	2.250	6	1.0	1.0	10000.0	.00	28.
600.	1.657	6	1.0	1.0	10000.0	.00	6.
700.	1.285	6	1.0	1.0	10000.0	.00	1.
800.	1.035	6	1.0	1.0	10000.0	.00	9.
900.	.8581	6	1.0	1.0	10000.0	.00	11.
1000.	.7273	6	1.0	1.0	10000.0	.00	35.
1100.	.6276	6	1.0	1.0	10000.0	.00	12.
1200.	.5496	6	1.0	1.0	10000.0	.00	29.
1300.	.4871	6	1.0	1.0	10000.0	.00	29.
1400.	.4362	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	.3940	6	1.0	1.0	10000.0	.00	29.
1600.	.3586	6	1.0	1.0	10000.0	.00	12.
1700.	.3285	6	1.0	1.0	10000.0	.00	29.
1800.	.3027	6	1.0	1.0	10000.0	.00	12.
1900.	.2803	6	1.0	1.0	10000.0	.00	20.
2000.	.2608	6	1.0	1.0	10000.0	.00	29.
2100.	.2436	6	1.0	1.0	10000.0	.00	43.
2200.	.2284	6	1.0	1.0	10000.0	.00	41.
2300.	.2148	6	1.0	1.0	10000.0	.00	41.
2400.	.2027	6	1.0	1.0	10000.0	.00	43.
2500.	.1917	6	1.0	1.0	10000.0	.00	43.
2600.	.1818	6	1.0	1.0	10000.0	.00	43.
2700.	.1728	6	1.0	1.0	10000.0	.00	41.
2800.	.1646	6	1.0	1.0	10000.0	.00	41.
2900.	.1571	6	1.0	1.0	10000.0	.00	43.
3000.	.1503	6	1.0	1.0	10000.0	.00	43.
3500.	.1229	6	1.0	1.0	10000.0	.00	43.
4000.	.1037	6	1.0	1.0	10000.0	.00	43.
4500.	.8944E-01	6	1.0	1.0	10000.0	.00	5.
5000.	.7853E-01	6	1.0	1.0	10000.0	.00	5.
5500.	.6992E-01	6	1.0	1.0	10000.0	.00	5.
6000.	.6297E-01	6	1.0	1.0	10000.0	.00	5.
6500.	.5724E-01	6	1.0	1.0	10000.0	.00	5.
7000.	.5245E-01	6	1.0	1.0	10000.0	.00	5.
7500.	.4838E-01	6	1.0	1.0	10000.0	.00	5.
8000.	.4489E-01	6	1.0	1.0	10000.0	.00	31.
8500.	.4186E-01	6	1.0	1.0	10000.0	.00	39.
9000.	.3920E-01	6	1.0	1.0	10000.0	.00	39.
9500.	.3686E-01	6	1.0	1.0	10000.0	.00	39.
10000.	.3478E-01	6	1.0	1.0	10000.0	.00	39.
15000.	.2216E-01	6	1.0	1.0	10000.0	.00	39.
20000.	.1624E-01	6	1.0	1.0	10000.0	.00	26.
25000.	.1280E-01	6	1.0	1.0	10000.0	.00	26.
30000.	.1057E-01	6	1.0	1.0	10000.0	.00	26.
40000.	.7831E-02	6	1.0	1.0	10000.0	.00	44.
50000.	.6217E-02	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	784.1	6	1.0	1.0	10000.0	.00	45.

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR MAXIMUM CONCENTRATION

****
*** END OF SCREEN MODEL OUTPUT ***
****

04/17/01
07:59:44

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - Chloroform

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.111800E-02
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	13.0767
LENGTH OF SMALLER SIDE (M)	=	13.0767
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.1392E+05	2.856281	15.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****
*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	.1392E+05	6	1.0	1.0	10000.0	.00	45.
100.	715.4	6	1.0	1.0	10000.0	.00	39.
200.	201.7	6	1.0	1.0	10000.0	.00	36.
300.	97.24	6	1.0	1.0	10000.0	.00	2.
400.	58.61	6	1.0	1.0	10000.0	.00	24.
500.	39.93	6	1.0	1.0	10000.0	.00	28.
600.	29.40	6	1.0	1.0	10000.0	.00	6.
700.	22.81	6	1.0	1.0	10000.0	.00	1.
800.	18.37	6	1.0	1.0	10000.0	.00	9.
900.	15.23	6	1.0	1.0	10000.0	.00	11.
1000.	12.91	6	1.0	1.0	10000.0	.00	35.
1100.	11.14	6	1.0	1.0	10000.0	.00	12.
1200.	9.753	6	1.0	1.0	10000.0	.00	29.
1300.	8.644	6	1.0	1.0	10000.0	.00	29.
1400.	7.741	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	6.992	6	1.0	1.0	10000.0	.00	29.
1600.	6.364	6	1.0	1.0	10000.0	.00	12.
1700.	5.830	6	1.0	1.0	10000.0	.00	29.
1800.	5.372	6	1.0	1.0	10000.0	.00	12.
1900.	4.975	6	1.0	1.0	10000.0	.00	20.
2000.	4.628	6	1.0	1.0	10000.0	.00	29.
2100.	4.323	6	1.0	1.0	10000.0	.00	43.
2200.	4.053	6	1.0	1.0	10000.0	.00	41.
2300.	3.812	6	1.0	1.0	10000.0	.00	41.
2400.	3.597	6	1.0	1.0	10000.0	.00	43.
2500.	3.402	6	1.0	1.0	10000.0	.00	43.
2600.	3.227	6	1.0	1.0	10000.0	.00	43.
2700.	3.067	6	1.0	1.0	10000.0	.00	41.
2800.	2.922	6	1.0	1.0	10000.0	.00	41.
2900.	2.789	6	1.0	1.0	10000.0	.00	43.
3000.	2.667	6	1.0	1.0	10000.0	.00	43.
3500.	2.181	6	1.0	1.0	10000.0	.00	43.
4000.	1.840	6	1.0	1.0	10000.0	.00	43.
4500.	1.587	6	1.0	1.0	10000.0	.00	5.
5000.	1.394	6	1.0	1.0	10000.0	.00	5.
5500.	1.241	6	1.0	1.0	10000.0	.00	5.
6000.	1.117	6	1.0	1.0	10000.0	.00	5.
6500.	1.016	6	1.0	1.0	10000.0	.00	5.
7000.	.9308	6	1.0	1.0	10000.0	.00	5.
7500.	.8586	6	1.0	1.0	10000.0	.00	5.
8000.	.7966	6	1.0	1.0	10000.0	.00	31.
8500.	.7428	6	1.0	1.0	10000.0	.00	39.
9000.	.6957	6	1.0	1.0	10000.0	.00	39.
9500.	.6541	6	1.0	1.0	10000.0	.00	39.
10000.	.6171	6	1.0	1.0	10000.0	.00	39.
15000.	.3933	6	1.0	1.0	10000.0	.00	39.
20000.	.2882	6	1.0	1.0	10000.0	.00	26.
25000.	.2272	6	1.0	1.0	10000.0	.00	26.
30000.	.1875	6	1.0	1.0	10000.0	.00	26.
40000.	.1390	6	1.0	1.0	10000.0	.00	44.
50000.	.1103	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	.1392E+05	6	1.0	1.0	10000.0	.00	45.

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DIST     = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC     = MAXIMUM GROUND LEVEL CONCENTRATION
STAB     = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M     = WIND SPEED AT THE 10-M LEVEL
USTK     = WIND SPEED AT STACK HEIGHT
MIX HT   = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR
          MAXIMUM CONCENTRATION
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**********************************
*** END OF SCREEN MODEL OUTPUT ***
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04/17/01
08:02:35

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - 1,1-Dichloroethane

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.127100E-02
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	13.0767
LENGTH OF SMALLER SIDE (M)	=	13.0767
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.1582E+05	3.915051	15.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****
*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	.1582E+05	6	1.0	1.0	10000.0	.00	45.
100.	813.3	6	1.0	1.0	10000.0	.00	39.
200.	229.3	6	1.0	1.0	10000.0	.00	36.
300.	110.5	6	1.0	1.0	10000.0	.00	2.
400.	66.63	6	1.0	1.0	10000.0	.00	24.
500.	45.40	6	1.0	1.0	10000.0	.00	28.
600.	33.42	6	1.0	1.0	10000.0	.00	6.
700.	25.93	6	1.0	1.0	10000.0	.00	1.
800.	20.88	6	1.0	1.0	10000.0	.00	9.
900.	17.31	6	1.0	1.0	10000.0	.00	11.
1000.	14.67	6	1.0	1.0	10000.0	.00	35.
1100.	12.66	6	1.0	1.0	10000.0	.00	12.
1200.	11.09	6	1.0	1.0	10000.0	.00	29.
1300.	9.827	6	1.0	1.0	10000.0	.00	29.
1400.	8.800	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	7.949	6	1.0	1.0	10000.0	.00	29.
1600.	7.235	6	1.0	1.0	10000.0	.00	12.
1700.	6.628	6	1.0	1.0	10000.0	.00	29.
1800.	6.107	6	1.0	1.0	10000.0	.00	12.
1900.	5.655	6	1.0	1.0	10000.0	.00	20.
2000.	5.261	6	1.0	1.0	10000.0	.00	29.
2100.	4.915	6	1.0	1.0	10000.0	.00	43.
2200.	4.608	6	1.0	1.0	10000.0	.00	41.
2300.	4.334	6	1.0	1.0	10000.0	.00	41.
2400.	4.089	6	1.0	1.0	10000.0	.00	43.
2500.	3.868	6	1.0	1.0	10000.0	.00	43.
2600.	3.668	6	1.0	1.0	10000.0	.00	43.
2700.	3.487	6	1.0	1.0	10000.0	.00	41.
2800.	3.322	6	1.0	1.0	10000.0	.00	41.
2900.	3.170	6	1.0	1.0	10000.0	.00	43.
3000.	3.031	6	1.0	1.0	10000.0	.00	43.
3500.	2.480	6	1.0	1.0	10000.0	.00	43.
4000.	2.091	6	1.0	1.0	10000.0	.00	43.
4500.	1.804	6	1.0	1.0	10000.0	.00	5.
5000.	1.584	6	1.0	1.0	10000.0	.00	5.
5500.	1.411	6	1.0	1.0	10000.0	.00	5.
6000.	1.270	6	1.0	1.0	10000.0	.00	5.
6500.	1.155	6	1.0	1.0	10000.0	.00	5.
7000.	1.058	6	1.0	1.0	10000.0	.00	5.
7500.	.9761	6	1.0	1.0	10000.0	.00	5.
8000.	.9056	6	1.0	1.0	10000.0	.00	31.
8500.	.8444	6	1.0	1.0	10000.0	.00	39.
9000.	.7909	6	1.0	1.0	10000.0	.00	39.
9500.	.7436	6	1.0	1.0	10000.0	.00	39.
10000.	.7016	6	1.0	1.0	10000.0	.00	39.
15000.	.4471	6	1.0	1.0	10000.0	.00	39.
20000.	.3276	6	1.0	1.0	10000.0	.00	26.
25000.	.2583	6	1.0	1.0	10000.0	.00	26.
30000.	.2132	6	1.0	1.0	10000.0	.00	26.
40000.	.1580	6	1.0	1.0	10000.0	.00	44.
50000.	.1254	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	.1582E+05	6	1.0	1.0	10000.0	.00	45.

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR MAXIMUM CONCENTRATION

****
*** END OF SCREEN MODEL OUTPUT ***
****

04/17/01
08:03:47

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - 1,2-Dichloroethane

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.447000E-03
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	13.0767
LENGTH OF SMALLER SIDE (M)	=	13.0767
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	5564.	1.376949	15.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	5564.	6	1.0	1.0	10000.0	.00	45.
100.	286.0	6	1.0	1.0	10000.0	.00	39.
200.	80.66	6	1.0	1.0	10000.0	.00	36.
300.	38.88	6	1.0	1.0	10000.0	.00	2.
400.	23.43	6	1.0	1.0	10000.0	.00	24.
500.	15.97	6	1.0	1.0	10000.0	.00	28.
600.	11.75	6	1.0	1.0	10000.0	.00	6.
700.	9.119	6	1.0	1.0	10000.0	.00	1.
800.	7.345	6	1.0	1.0	10000.0	.00	9.
900.	6.088	6	1.0	1.0	10000.0	.00	11.
1000.	5.161	6	1.0	1.0	10000.0	.00	35.
1100.	4.453	6	1.0	1.0	10000.0	.00	12.
1200.	3.899	6	1.0	1.0	10000.0	.00	29.
1300.	3.456	6	1.0	1.0	10000.0	.00	29.
1400.	3.095	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	2.796	6	1.0	1.0	10000.0	.00	29.
1600.	2.544	6	1.0	1.0	10000.0	.00	12.
1700.	2.331	6	1.0	1.0	10000.0	.00	29.
1800.	2.148	6	1.0	1.0	10000.0	.00	12.
1900.	1.989	6	1.0	1.0	10000.0	.00	20.
2000.	1.850	6	1.0	1.0	10000.0	.00	29.
2100.	1.728	6	1.0	1.0	10000.0	.00	43.
2200.	1.620	6	1.0	1.0	10000.0	.00	41.
2300.	1.524	6	1.0	1.0	10000.0	.00	41.
2400.	1.438	6	1.0	1.0	10000.0	.00	43.
2500.	1.360	6	1.0	1.0	10000.0	.00	43.
2600.	1.290	6	1.0	1.0	10000.0	.00	43.
2700.	1.226	6	1.0	1.0	10000.0	.00	41.
2800.	1.168	6	1.0	1.0	10000.0	.00	41.
2900.	1.115	6	1.0	1.0	10000.0	.00	43.
3000.	1.066	6	1.0	1.0	10000.0	.00	43.
3500.	.8721	6	1.0	1.0	10000.0	.00	43.
4000.	.7355	6	1.0	1.0	10000.0	.00	43.
4500.	.6346	6	1.0	1.0	10000.0	.00	5.
5000.	.5572	6	1.0	1.0	10000.0	.00	5.
5500.	.4961	6	1.0	1.0	10000.0	.00	5.
6000.	.4468	6	1.0	1.0	10000.0	.00	5.
6500.	.4062	6	1.0	1.0	10000.0	.00	5.
7000.	.3722	6	1.0	1.0	10000.0	.00	5.
7500.	.3433	6	1.0	1.0	10000.0	.00	5.
8000.	.3185	6	1.0	1.0	10000.0	.00	31.
8500.	.2970	6	1.0	1.0	10000.0	.00	39.
9000.	.2781	6	1.0	1.0	10000.0	.00	39.
9500.	.2615	6	1.0	1.0	10000.0	.00	39.
10000.	.2467	6	1.0	1.0	10000.0	.00	39.
15000.	.1572	6	1.0	1.0	10000.0	.00	39.
20000.	.1152	6	1.0	1.0	10000.0	.00	26.
25000.	.9085E-01	6	1.0	1.0	10000.0	.00	26.
30000.	.7497E-01	6	1.0	1.0	10000.0	.00	26.
40000.	.5556E-01	6	1.0	1.0	10000.0	.00	44.
50000.	.4411E-01	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	5564.	6	1.0	1.0	10000.0	.00	45.

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR MAXIMUM CONCENTRATION

****
*** END OF SCREEN MODEL OUTPUT ***
****

04/17/01
08:01:07

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - Total-1,2-Dichloroethene

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.155400E-02
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	13.0767
LENGTH OF SMALLER SIDE (M)	=	13.0767
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.1934E+05	4.884845	15.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****
*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	.1934E+05	6	1.0	1.0	10000.0	.00	45.
100.	994.4	6	1.0	1.0	10000.0	.00	39.
200.	280.4	6	1.0	1.0	10000.0	.00	36.
300.	135.2	6	1.0	1.0	10000.0	.00	2.
400.	81.46	6	1.0	1.0	10000.0	.00	24.
500.	55.51	6	1.0	1.0	10000.0	.00	28.
600.	40.86	6	1.0	1.0	10000.0	.00	6.
700.	31.70	6	1.0	1.0	10000.0	.00	1.
800.	25.53	6	1.0	1.0	10000.0	.00	9.
900.	21.17	6	1.0	1.0	10000.0	.00	11.
1000.	17.94	6	1.0	1.0	10000.0	.00	35.
1100.	15.48	6	1.0	1.0	10000.0	.00	12.
1200.	13.56	6	1.0	1.0	10000.0	.00	29.
1300.	12.02	6	1.0	1.0	10000.0	.00	29.
1400.	10.76	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	9.719	6	1.0	1.0	10000.0	.00	29.
1600.	8.845	6	1.0	1.0	10000.0	.00	12.
1700.	8.103	6	1.0	1.0	10000.0	.00	29.
1800.	7.467	6	1.0	1.0	10000.0	.00	12.
1900.	6.915	6	1.0	1.0	10000.0	.00	20.
2000.	6.433	6	1.0	1.0	10000.0	.00	29.
2100.	6.009	6	1.0	1.0	10000.0	.00	43.
2200.	5.633	6	1.0	1.0	10000.0	.00	41.
2300.	5.299	6	1.0	1.0	10000.0	.00	41.
2400.	4.999	6	1.0	1.0	10000.0	.00	43.
2500.	4.729	6	1.0	1.0	10000.0	.00	43.
2600.	4.485	6	1.0	1.0	10000.0	.00	43.
2700.	4.263	6	1.0	1.0	10000.0	.00	41.
2800.	4.061	6	1.0	1.0	10000.0	.00	41.
2900.	3.876	6	1.0	1.0	10000.0	.00	43.
3000.	3.706	6	1.0	1.0	10000.0	.00	43.
3500.	3.032	6	1.0	1.0	10000.0	.00	43.
4000.	2.557	6	1.0	1.0	10000.0	.00	43.
4500.	2.206	6	1.0	1.0	10000.0	.00	5.
5000.	1.937	6	1.0	1.0	10000.0	.00	5.
5500.	1.725	6	1.0	1.0	10000.0	.00	5.
6000.	1.553	6	1.0	1.0	10000.0	.00	5.
6500.	1.412	6	1.0	1.0	10000.0	.00	5.
7000.	1.294	6	1.0	1.0	10000.0	.00	5.
7500.	1.193	6	1.0	1.0	10000.0	.00	5.
8000.	1.107	6	1.0	1.0	10000.0	.00	31.
8500.	1.032	6	1.0	1.0	10000.0	.00	39.
9000.	.9670	6	1.0	1.0	10000.0	.00	39.
9500.	.9092	6	1.0	1.0	10000.0	.00	39.
10000.	.8578	6	1.0	1.0	10000.0	.00	39.
15000.	.5467	6	1.0	1.0	10000.0	.00	39.
20000.	.4006	6	1.0	1.0	10000.0	.00	26.
25000.	.3158	6	1.0	1.0	10000.0	.00	26.
30000.	.2606	6	1.0	1.0	10000.0	.00	26.
40000.	.1932	6	1.0	1.0	10000.0	.00	44.
50000.	.1534	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	.1934E+05	6	1.0	1.0	10000.0	.00	45.

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR MAXIMUM CONCENTRATION

****
*** END OF SCREEN MODEL OUTPUT ***
****

04/17/01
08:05:31

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - Ethylbenzene

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.490000E-04
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	13.0767
LENGTH OF SMALLER SIDE (M)	=	13.0767
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	609.9	0.140702	15.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	609.9	6	1.0	1.0	10000.0	.00	45.
100.	31.35	6	1.0	1.0	10000.0	.00	39.
200.	8.842	6	1.0	1.0	10000.0	.00	36.
300.	4.262	6	1.0	1.0	10000.0	.00	2.
400.	2.569	6	1.0	1.0	10000.0	.00	24.
500.	1.750	6	1.0	1.0	10000.0	.00	28.
600.	1.288	6	1.0	1.0	10000.0	.00	6.
700.	.9996	6	1.0	1.0	10000.0	.00	1.
800.	.8051	6	1.0	1.0	10000.0	.00	9.
900.	.6674	6	1.0	1.0	10000.0	.00	11.
1000.	.5657	6	1.0	1.0	10000.0	.00	35.
1100.	.4882	6	1.0	1.0	10000.0	.00	12.
1200.	.4275	6	1.0	1.0	10000.0	.00	29.
1300.	.3789	6	1.0	1.0	10000.0	.00	29.
1400.	.3393	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	.3065	6	1.0	1.0	10000.0	.00	29.
1600.	.2789	6	1.0	1.0	10000.0	.00	12.
1700.	.2555	6	1.0	1.0	10000.0	.00	29.
1800.	.2354	6	1.0	1.0	10000.0	.00	12.
1900.	.2180	6	1.0	1.0	10000.0	.00	20.
2000.	.2028	6	1.0	1.0	10000.0	.00	29.
2100.	.1895	6	1.0	1.0	10000.0	.00	43.
2200.	.1776	6	1.0	1.0	10000.0	.00	41.
2300.	.1671	6	1.0	1.0	10000.0	.00	41.
2400.	.1576	6	1.0	1.0	10000.0	.00	43.
2500.	.1491	6	1.0	1.0	10000.0	.00	43.
2600.	.1414	6	1.0	1.0	10000.0	.00	43.
2700.	.1344	6	1.0	1.0	10000.0	.00	41.
2800.	.1281	6	1.0	1.0	10000.0	.00	41.
2900.	.1222	6	1.0	1.0	10000.0	.00	43.
3000.	.1169	6	1.0	1.0	10000.0	.00	43.
3500.	.9560E-01	6	1.0	1.0	10000.0	.00	43.
4000.	.8063E-01	6	1.0	1.0	10000.0	.00	43.
4500.	.6956E-01	6	1.0	1.0	10000.0	.00	5.
5000.	.6108E-01	6	1.0	1.0	10000.0	.00	5.
5500.	.5439E-01	6	1.0	1.0	10000.0	.00	5.
6000.	.4898E-01	6	1.0	1.0	10000.0	.00	5.
6500.	.4452E-01	6	1.0	1.0	10000.0	.00	5.
7000.	.4080E-01	6	1.0	1.0	10000.0	.00	5.
7500.	.3763E-01	6	1.0	1.0	10000.0	.00	5.
8000.	.3491E-01	6	1.0	1.0	10000.0	.00	31.
8500.	.3255E-01	6	1.0	1.0	10000.0	.00	39.
9000.	.3049E-01	6	1.0	1.0	10000.0	.00	39.
9500.	.2867E-01	6	1.0	1.0	10000.0	.00	39.
10000.	.2705E-01	6	1.0	1.0	10000.0	.00	39.
15000.	.1724E-01	6	1.0	1.0	10000.0	.00	39.
20000.	.1263E-01	6	1.0	1.0	10000.0	.00	26.
25000.	.9959E-02	6	1.0	1.0	10000.0	.00	26.
30000.	.8218E-02	6	1.0	1.0	10000.0	.00	26.
40000.	.6091E-02	6	1.0	1.0	10000.0	.00	44.
50000.	.4836E-02	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	609.9	6	1.0	1.0	10000.0	.00	45.

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR
MAXIMUM CONCENTRATION

****
*** END OF SCREEN MODEL OUTPUT ***
****

04/17/01
08:06:49

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 95250 ***

216 Paterson Plank Road Site - Methylene Chloride

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE                  =        AREA
   EMISSION RATE (G/(S-M**2))   =     .244500E-02
   SOURCE HEIGHT (M)            =        .0000
   LENGTH OF LARGER SIDE (M)    =     13.0767
   LENGTH OF SMALLER SIDE (M)   =     13.0767
   RECEPTOR HEIGHT (M)          =        .0000
   URBAN/RURAL OPTION           =       URBAN
   MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION         MAX CONC        MAX CONC       DIST TO    TERRAIN
  PROCEDURE          (UG/M**3)        (PPM)         MAX (M)     HT (M)
--------------    -----------    -----------    -------    -------
SIMPLE TERRAIN    .3043E+05        8.781331       15.        0.

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************

BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =     .000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************
*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST     CONC              U10M    USTK   MIX HT   PLUME   MAX DIR
   (M)    (UG/M**3)   STAB   (M/S)   (M/S)    (M)    HT (M)   (DEG)
-------  ----------   ----   -----   -----  ------   ------  -------
    15.   .3043E+05    6      1.0     1.0 10000.0      .00      45.
   100.   1565.        6      1.0     1.0 10000.0      .00      39.
   200.   441.2        6      1.0     1.0 10000.0      .00      36.
   300.   212.7        6      1.0     1.0 10000.0      .00       2.
   400.   128.2        6      1.0     1.0 10000.0      .00      24.
   500.   87.33        6      1.0     1.0 10000.0      .00      28.
   600.   64.29        6      1.0     1.0 10000.0      .00       6.
   700.   49.88        6      1.0     1.0 10000.0      .00       1.
   800.   40.18        6      1.0     1.0 10000.0      .00       9.
   900.   33.30        6      1.0     1.0 10000.0      .00      11.
  1000.   28.23        6      1.0     1.0 10000.0      .00      35.
  1100.   24.36        6      1.0     1.0 10000.0      .00      12.
  1200.   21.33        6      1.0     1.0 10000.0      .00      29.
  1300.   18.90        6      1.0     1.0 10000.0      .00      29.
  1400.   16.93        6      1.0     1.0 10000.0      .00      12.
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	15.29	6	1.0	1.0	10000.0	.00	29.
1600.	13.92	6	1.0	1.0	10000.0	.00	12.
1700.	12.75	6	1.0	1.0	10000.0	.00	29.
1800.	11.75	6	1.0	1.0	10000.0	.00	12.
1900.	10.88	6	1.0	1.0	10000.0	.00	20.
2000.	10.12	6	1.0	1.0	10000.0	.00	29.
2100.	9.454	6	1.0	1.0	10000.0	.00	43.
2200.	8.863	6	1.0	1.0	10000.0	.00	41.
2300.	8.337	6	1.0	1.0	10000.0	.00	41.
2400.	7.865	6	1.0	1.0	10000.0	.00	43.
2500.	7.441	6	1.0	1.0	10000.0	.00	43.
2600.	7.057	6	1.0	1.0	10000.0	.00	43.
2700.	6.708	6	1.0	1.0	10000.0	.00	41.
2800.	6.390	6	1.0	1.0	10000.0	.00	41.
2900.	6.099	6	1.0	1.0	10000.0	.00	43.
3000.	5.832	6	1.0	1.0	10000.0	.00	43.
3500.	4.770	6	1.0	1.0	10000.0	.00	43.
4000.	4.023	6	1.0	1.0	10000.0	.00	43.
4500.	3.471	6	1.0	1.0	10000.0	.00	5.
5000.	3.048	6	1.0	1.0	10000.0	.00	5.
5500.	2.714	6	1.0	1.0	10000.0	.00	5.
6000.	2.444	6	1.0	1.0	10000.0	.00	5.
6500.	2.222	6	1.0	1.0	10000.0	.00	5.
7000.	2.036	6	1.0	1.0	10000.0	.00	5.
7500.	1.878	6	1.0	1.0	10000.0	.00	5.
8000.	1.742	6	1.0	1.0	10000.0	.00	31.
8500.	1.624	6	1.0	1.0	10000.0	.00	39.
9000.	1.521	6	1.0	1.0	10000.0	.00	39.
9500.	1.430	6	1.0	1.0	10000.0	.00	39.
10000.	1.350	6	1.0	1.0	10000.0	.00	39.
15000.	.8601	6	1.0	1.0	10000.0	.00	39.
20000.	.6302	6	1.0	1.0	10000.0	.00	26.
25000.	.4969	6	1.0	1.0	10000.0	.00	26.
30000.	.4101	6	1.0	1.0	10000.0	.00	26.
40000.	.3039	6	1.0	1.0	10000.0	.00	44.
50000.	.2413	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	.3043E+05	6	1.0	1.0	10000.0	.00	45.

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR MAXIMUM CONCENTRATION

****
*** END OF SCREEN MODEL OUTPUT ***
****

04/17/01
08:09:05

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - 4-methyl-2-pentanone (MIBK)

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.112000E-03
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	13.0767
LENGTH OF SMALLER SIDE (M)	=	13.0767
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	1394.	0.340848	15.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	1394.	6	1.0	1.0	10000.0	.00	45.
100.	71.67	6	1.0	1.0	10000.0	.00	39.
200.	20.21	6	1.0	1.0	10000.0	.00	36.
300.	9.741	6	1.0	1.0	10000.0	.00	2.
400.	5.871	6	1.0	1.0	10000.0	.00	24.
500.	4.001	6	1.0	1.0	10000.0	.00	28.
600.	2.945	6	1.0	1.0	10000.0	.00	6.
700.	2.285	6	1.0	1.0	10000.0	.00	1.
800.	1.840	6	1.0	1.0	10000.0	.00	9.
900.	1.525	6	1.0	1.0	10000.0	.00	11.
1000.	1.293	6	1.0	1.0	10000.0	.00	35.
1100.	1.116	6	1.0	1.0	10000.0	.00	12.
1200.	.9771	6	1.0	1.0	10000.0	.00	29.
1300.	.8660	6	1.0	1.0	10000.0	.00	29.
1400.	.7755	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	.7005	6	1.0	1.0	10000.0	.00	29.
1600.	.6375	6	1.0	1.0	10000.0	.00	12.
1700.	.5840	6	1.0	1.0	10000.0	.00	29.
1800.	.5381	6	1.0	1.0	10000.0	.00	12.
1900.	.4984	6	1.0	1.0	10000.0	.00	20.
2000.	.4636	6	1.0	1.0	10000.0	.00	29.
2100.	.4331	6	1.0	1.0	10000.0	.00	43.
2200.	.4060	6	1.0	1.0	10000.0	.00	41.
2300.	.3819	6	1.0	1.0	10000.0	.00	41.
2400.	.3603	6	1.0	1.0	10000.0	.00	43.
2500.	.3408	6	1.0	1.0	10000.0	.00	43.
2600.	.3233	6	1.0	1.0	10000.0	.00	43.
2700.	.3073	6	1.0	1.0	10000.0	.00	41.
2800.	.2927	6	1.0	1.0	10000.0	.00	41.
2900.	.2794	6	1.0	1.0	10000.0	.00	43.
3000.	.2671	6	1.0	1.0	10000.0	.00	43.
3500.	.2185	6	1.0	1.0	10000.0	.00	43.
4000.	.1843	6	1.0	1.0	10000.0	.00	43.
4500.	.1590	6	1.0	1.0	10000.0	.00	5.
5000.	.1396	6	1.0	1.0	10000.0	.00	5.
5500.	.1243	6	1.0	1.0	10000.0	.00	5.
6000.	.1119	6	1.0	1.0	10000.0	.00	5.
6500.	.1018	6	1.0	1.0	10000.0	.00	5.
7000.	.9325E-01	6	1.0	1.0	10000.0	.00	5.
7500.	.8601E-01	6	1.0	1.0	10000.0	.00	5.
8000.	.7980E-01	6	1.0	1.0	10000.0	.00	31.
8500.	.7441E-01	6	1.0	1.0	10000.0	.00	39.
9000.	.6969E-01	6	1.0	1.0	10000.0	.00	39.
9500.	.6553E-01	6	1.0	1.0	10000.0	.00	39.
10000.	.6182E-01	6	1.0	1.0	10000.0	.00	39.
15000.	.3940E-01	6	1.0	1.0	10000.0	.00	39.
20000.	.2887E-01	6	1.0	1.0	10000.0	.00	26.
25000.	.2276E-01	6	1.0	1.0	10000.0	.00	26.
30000.	.1878E-01	6	1.0	1.0	10000.0	.00	26.
40000.	.1392E-01	6	1.0	1.0	10000.0	.00	44.
50000.	.1105E-01	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	1394.	6	1.0	1.0	10000.0	.00	45.

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR MAXIMUM CONCENTRATION

****
*** END OF SCREEN MODEL OUTPUT ***
****

04/17/01
08:10:36

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - 1,1,1-TCA

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.699000E-03
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	13.0767
LENGTH OF SMALLER SIDE (M)	=	13.0767
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	8700.	1.597826	15.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	8700.	6	1.0	1.0	10000.0	.00	45.
100.	447.3	6	1.0	1.0	10000.0	.00	39.
200.	126.1	6	1.0	1.0	10000.0	.00	36.
300.	60.80	6	1.0	1.0	10000.0	.00	2.
400.	36.64	6	1.0	1.0	10000.0	.00	24.
500.	24.97	6	1.0	1.0	10000.0	.00	28.
600.	18.38	6	1.0	1.0	10000.0	.00	6.
700.	14.26	6	1.0	1.0	10000.0	.00	1.
800.	11.49	6	1.0	1.0	10000.0	.00	9.
900.	9.520	6	1.0	1.0	10000.0	.00	11.
1000.	8.070	6	1.0	1.0	10000.0	.00	35.
1100.	6.964	6	1.0	1.0	10000.0	.00	12.
1200.	6.098	6	1.0	1.0	10000.0	.00	29.
1300.	5.405	6	1.0	1.0	10000.0	.00	29.
1400.	4.840	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	4.372	6	1.0	1.0	10000.0	.00	29.
1600.	3.979	6	1.0	1.0	10000.0	.00	12.
1700.	3.645	6	1.0	1.0	10000.0	.00	29.
1800.	3.358	6	1.0	1.0	10000.0	.00	12.
1900.	3.110	6	1.0	1.0	10000.0	.00	20.
2000.	2.894	6	1.0	1.0	10000.0	.00	29.
2100.	2.703	6	1.0	1.0	10000.0	.00	43.
2200.	2.534	6	1.0	1.0	10000.0	.00	41.
2300.	2.383	6	1.0	1.0	10000.0	.00	41.
2400.	2.249	6	1.0	1.0	10000.0	.00	43.
2500.	2.127	6	1.0	1.0	10000.0	.00	43.
2600.	2.017	6	1.0	1.0	10000.0	.00	43.
2700.	1.918	6	1.0	1.0	10000.0	.00	41.
2800.	1.827	6	1.0	1.0	10000.0	.00	41.
2900.	1.744	6	1.0	1.0	10000.0	.00	43.
3000.	1.667	6	1.0	1.0	10000.0	.00	43.
3500.	1.364	6	1.0	1.0	10000.0	.00	43.
4000.	1.150	6	1.0	1.0	10000.0	.00	43.
4500.	.9923	6	1.0	1.0	10000.0	.00	5.
5000.	.8713	6	1.0	1.0	10000.0	.00	5.
5500.	.7758	6	1.0	1.0	10000.0	.00	5.
6000.	.6987	6	1.0	1.0	10000.0	.00	5.
6500.	.6351	6	1.0	1.0	10000.0	.00	5.
7000.	.5820	6	1.0	1.0	10000.0	.00	5.
7500.	.5368	6	1.0	1.0	10000.0	.00	5.
8000.	.4980	6	1.0	1.0	10000.0	.00	31.
8500.	.4644	6	1.0	1.0	10000.0	.00	39.
9000.	.4349	6	1.0	1.0	10000.0	.00	39.
9500.	.4089	6	1.0	1.0	10000.0	.00	39.
10000.	.3858	6	1.0	1.0	10000.0	.00	39.
15000.	.2459	6	1.0	1.0	10000.0	.00	39.
20000.	.1802	6	1.0	1.0	10000.0	.00	26.
25000.	.1421	6	1.0	1.0	10000.0	.00	26.
30000.	.1172	6	1.0	1.0	10000.0	.00	26.
40000.	.8688E-01	6	1.0	1.0	10000.0	.00	44.
50000.	.6898E-01	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	8700.	6	1.0	1.0	10000.0	.00	45.

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR MAXIMUM CONCENTRATION

****
*** END OF SCREEN MODEL OUTPUT ***
****

04/17/01
08:15:37

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - TCE

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.405000E-03
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	13.0767
LENGTH OF SMALLER SIDE (M)	=	13.0767
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	5041.	0.939912	15.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	5041.	6	1.0	1.0	10000.0	.00	45.
100.	259.2	6	1.0	1.0	10000.0	.00	39.
200.	73.08	6	1.0	1.0	10000.0	.00	36.
300.	35.22	6	1.0	1.0	10000.0	.00	2.
400.	21.23	6	1.0	1.0	10000.0	.00	24.
500.	14.47	6	1.0	1.0	10000.0	.00	28.
600.	10.65	6	1.0	1.0	10000.0	.00	6.
700.	8.262	6	1.0	1.0	10000.0	.00	1.
800.	6.655	6	1.0	1.0	10000.0	.00	9.
900.	5.516	6	1.0	1.0	10000.0	.00	11.
1000.	4.676	6	1.0	1.0	10000.0	.00	35.
1100.	4.035	6	1.0	1.0	10000.0	.00	12.
1200.	3.533	6	1.0	1.0	10000.0	.00	29.
1300.	3.131	6	1.0	1.0	10000.0	.00	29.
1400.	2.804	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	2.533	6	1.0	1.0	10000.0	.00	29.
1600.	2.305	6	1.0	1.0	10000.0	.00	12.
1700.	2.112	6	1.0	1.0	10000.0	.00	29.
1800.	1.946	6	1.0	1.0	10000.0	.00	12.
1900.	1.802	6	1.0	1.0	10000.0	.00	20.
2000.	1.677	6	1.0	1.0	10000.0	.00	29.
2100.	1.566	6	1.0	1.0	10000.0	.00	43.
2200.	1.468	6	1.0	1.0	10000.0	.00	41.
2300.	1.381	6	1.0	1.0	10000.0	.00	41.
2400.	1.303	6	1.0	1.0	10000.0	.00	43.
2500.	1.233	6	1.0	1.0	10000.0	.00	43.
2600.	1.169	6	1.0	1.0	10000.0	.00	43.
2700.	1.111	6	1.0	1.0	10000.0	.00	41.
2800.	1.058	6	1.0	1.0	10000.0	.00	41.
2900.	1.010	6	1.0	1.0	10000.0	.00	43.
3000.	.9660	6	1.0	1.0	10000.0	.00	43.
3500.	.7902	6	1.0	1.0	10000.0	.00	43.
4000.	.6664	6	1.0	1.0	10000.0	.00	43.
4500.	.5749	6	1.0	1.0	10000.0	.00	5.
5000.	.5048	6	1.0	1.0	10000.0	.00	5.
5500.	.4495	6	1.0	1.0	10000.0	.00	5.
6000.	.4048	6	1.0	1.0	10000.0	.00	5.
6500.	.3680	6	1.0	1.0	10000.0	.00	5.
7000.	.3372	6	1.0	1.0	10000.0	.00	5.
7500.	.3110	6	1.0	1.0	10000.0	.00	5.
8000.	.2886	6	1.0	1.0	10000.0	.00	31.
8500.	.2691	6	1.0	1.0	10000.0	.00	39.
9000.	.2520	6	1.0	1.0	10000.0	.00	39.
9500.	.2369	6	1.0	1.0	10000.0	.00	39.
10000.	.2236	6	1.0	1.0	10000.0	.00	39.
15000.	.1425	6	1.0	1.0	10000.0	.00	39.
20000.	.1044	6	1.0	1.0	10000.0	.00	26.
25000.	.8231E-01	6	1.0	1.0	10000.0	.00	26.
30000.	.6793E-01	6	1.0	1.0	10000.0	.00	26.
40000.	.5034E-01	6	1.0	1.0	10000.0	.00	44.
50000.	.3997E-01	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	5041.	6	1.0	1.0	10000.0	.00	45.

```
DIST     = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC     = MAXIMUM GROUND LEVEL CONCENTRATION
STAB     = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M     = WIND SPEED AT THE 10-M LEVEL
USTK     = WIND SPEED AT STACK HEIGHT
MIX HT   = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR
          MAXIMUM CONCENTRATION
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**********************************
*** END OF SCREEN MODEL OUTPUT ***
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04/17/01
08:14:11

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - Toluene

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.147000E-03
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	13.0767
LENGTH OF SMALLER SIDE (M)	=	13.0767
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	1830.	0.486808	15.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	1830.	6	1.0	1.0	10000.0	.00	45.
100.	94.06	6	1.0	1.0	10000.0	.00	39.
200.	26.53	6	1.0	1.0	10000.0	.00	36.
300.	12.79	6	1.0	1.0	10000.0	.00	2.
400.	7.706	6	1.0	1.0	10000.0	.00	24.
500.	5.251	6	1.0	1.0	10000.0	.00	28.
600.	3.865	6	1.0	1.0	10000.0	.00	6.
700.	2.999	6	1.0	1.0	10000.0	.00	1.
800.	2.415	6	1.0	1.0	10000.0	.00	9.
900.	2.002	6	1.0	1.0	10000.0	.00	11.
1000.	1.697	6	1.0	1.0	10000.0	.00	35.
1100.	1.465	6	1.0	1.0	10000.0	.00	12.
1200.	1.282	6	1.0	1.0	10000.0	.00	29.
1300.	1.137	6	1.0	1.0	10000.0	.00	29.
1400.	1.018	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	.9194	6	1.0	1.0	10000.0	.00	29.
1600.	.8367	6	1.0	1.0	10000.0	.00	12.
1700.	.7665	6	1.0	1.0	10000.0	.00	29.
1800.	.7063	6	1.0	1.0	10000.0	.00	12.
1900.	.6541	6	1.0	1.0	10000.0	.00	20.
2000.	.6085	6	1.0	1.0	10000.0	.00	29.
2100.	.5684	6	1.0	1.0	10000.0	.00	43.
2200.	.5329	6	1.0	1.0	10000.0	.00	41.
2300.	.5012	6	1.0	1.0	10000.0	.00	41.
2400.	.4729	6	1.0	1.0	10000.0	.00	43.
2500.	.4474	6	1.0	1.0	10000.0	.00	43.
2600.	.4243	6	1.0	1.0	10000.0	.00	43.
2700.	.4033	6	1.0	1.0	10000.0	.00	41.
2800.	.3842	6	1.0	1.0	10000.0	.00	41.
2900.	.3667	6	1.0	1.0	10000.0	.00	43.
3000.	.3506	6	1.0	1.0	10000.0	.00	43.
3500.	.2868	6	1.0	1.0	10000.0	.00	43.
4000.	.2419	6	1.0	1.0	10000.0	.00	43.
4500.	.2087	6	1.0	1.0	10000.0	.00	5.
5000.	.1832	6	1.0	1.0	10000.0	.00	5.
5500.	.1632	6	1.0	1.0	10000.0	.00	5.
6000.	.1469	6	1.0	1.0	10000.0	.00	5.
6500.	.1336	6	1.0	1.0	10000.0	.00	5.
7000.	.1224	6	1.0	1.0	10000.0	.00	5.
7500.	.1129	6	1.0	1.0	10000.0	.00	5.
8000.	.1047	6	1.0	1.0	10000.0	.00	31.
8500.	.9766E-01	6	1.0	1.0	10000.0	.00	39.
9000.	.9147E-01	6	1.0	1.0	10000.0	.00	39.
9500.	.8600E-01	6	1.0	1.0	10000.0	.00	39.
10000.	.8114E-01	6	1.0	1.0	10000.0	.00	39.
15000.	.5171E-01	6	1.0	1.0	10000.0	.00	39.
20000.	.3789E-01	6	1.0	1.0	10000.0	.00	26.
25000.	.2988E-01	6	1.0	1.0	10000.0	.00	26.
30000.	.2466E-01	6	1.0	1.0	10000.0	.00	26.
40000.	.1827E-01	6	1.0	1.0	10000.0	.00	44.
50000.	.1451E-01	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	1830.	6	1.0	1.0	10000.0	.00	45.

```
DIST     = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC     = MAXIMUM GROUND LEVEL CONCENTRATION
STAB     = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M     = WIND SPEED AT THE 10-M LEVEL
USTK     = WIND SPEED AT STACK HEIGHT
MIX HT   = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR
          MAXIMUM CONCENTRATION
```

****
*** END OF SCREEN MODEL OUTPUT ***
****

04/17/01
08:12:35

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - PCE

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.980000E-04
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	13.0767
LENGTH OF SMALLER SIDE (M)	=	13.0767
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	1220.	0.180277	15.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	1220.	6	1.0	1.0	10000.0	.00	45.
100.	62.71	6	1.0	1.0	10000.0	.00	39.
200.	17.68	6	1.0	1.0	10000.0	.00	36.
300.	8.524	6	1.0	1.0	10000.0	.00	2.
400.	5.137	6	1.0	1.0	10000.0	.00	24.
500.	3.500	6	1.0	1.0	10000.0	.00	28.
600.	2.577	6	1.0	1.0	10000.0	.00	6.
700.	1.999	6	1.0	1.0	10000.0	.00	1.
800.	1.610	6	1.0	1.0	10000.0	.00	9.
900.	1.335	6	1.0	1.0	10000.0	.00	11.
1000.	1.131	6	1.0	1.0	10000.0	.00	35.
1100.	.9763	6	1.0	1.0	10000.0	.00	12.
1200.	.8549	6	1.0	1.0	10000.0	.00	29.
1300.	.7577	6	1.0	1.0	10000.0	.00	29.
1400.	.6785	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	.6129	6	1.0	1.0	10000.0	.00	29.
1600.	.5578	6	1.0	1.0	10000.0	.00	12.
1700.	.5110	6	1.0	1.0	10000.0	.00	29.
1800.	.4709	6	1.0	1.0	10000.0	.00	12.
1900.	.4361	6	1.0	1.0	10000.0	.00	20.
2000.	.4057	6	1.0	1.0	10000.0	.00	29.
2100.	.3789	6	1.0	1.0	10000.0	.00	43.
2200.	.3553	6	1.0	1.0	10000.0	.00	41.
2300.	.3342	6	1.0	1.0	10000.0	.00	41.
2400.	.3153	6	1.0	1.0	10000.0	.00	43.
2500.	.2982	6	1.0	1.0	10000.0	.00	43.
2600.	.2828	6	1.0	1.0	10000.0	.00	43.
2700.	.2689	6	1.0	1.0	10000.0	.00	41.
2800.	.2561	6	1.0	1.0	10000.0	.00	41.
2900.	.2445	6	1.0	1.0	10000.0	.00	43.
3000.	.2337	6	1.0	1.0	10000.0	.00	43.
3500.	.1912	6	1.0	1.0	10000.0	.00	43.
4000.	.1613	6	1.0	1.0	10000.0	.00	43.
4500.	.1391	6	1.0	1.0	10000.0	.00	5.
5000.	.1222	6	1.0	1.0	10000.0	.00	5.
5500.	.1088	6	1.0	1.0	10000.0	.00	5.
6000.	.9796E-01	6	1.0	1.0	10000.0	.00	5.
6500.	.8905E-01	6	1.0	1.0	10000.0	.00	5.
7000.	.8159E-01	6	1.0	1.0	10000.0	.00	5.
7500.	.7526E-01	6	1.0	1.0	10000.0	.00	5.
8000.	.6982E-01	6	1.0	1.0	10000.0	.00	31.
8500.	.6511E-01	6	1.0	1.0	10000.0	.00	39.
9000.	.6098E-01	6	1.0	1.0	10000.0	.00	39.
9500.	.5733E-01	6	1.0	1.0	10000.0	.00	39.
10000.	.5409E-01	6	1.0	1.0	10000.0	.00	39.
15000.	.3448E-01	6	1.0	1.0	10000.0	.00	39.
20000.	.2526E-01	6	1.0	1.0	10000.0	.00	26.
25000.	.1992E-01	6	1.0	1.0	10000.0	.00	26.
30000.	.1644E-01	6	1.0	1.0	10000.0	.00	26.
40000.	.1218E-01	6	1.0	1.0	10000.0	.00	44.
50000.	.9672E-02	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	1220.	6	1.0	1.0	10000.0	.00	45.

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR
MAXIMUM CONCENTRATION

****
*** END OF SCREEN MODEL OUTPUT ***
****

04/17/01
07:47:52

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 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 95250 ***

216 Paterson Plank Road Site -Vinyl chloride

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE                    =          AREA
   EMISSION RATE (G/(S-M**2))     =      .175210E-01
   SOURCE HEIGHT (M)              =         .0000
   LENGTH OF LARGER SIDE (M)      =       13.0767
   LENGTH OF SMALLER SIDE (M)     =       13.0767
   RECEPTOR HEIGHT (M)            =         .0000
   URBAN/RURAL OPTION             =         URBAN
   MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************
```

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.2181E+06	85.4952	15.	0.

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**************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
**************************************************

BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =     .000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************
*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	.2181E+06	6	1.0	1.0	10000.0	.00	45.
100.	.1121E+05	6	1.0	1.0	10000.0	.00	39.
200.	3162.	6	1.0	1.0	10000.0	.00	36.
300.	1524.	6	1.0	1.0	10000.0	.00	2.
400.	918.5	6	1.0	1.0	10000.0	.00	24.
500.	625.8	6	1.0	1.0	10000.0	.00	28.
600.	460.7	6	1.0	1.0	10000.0	.00	6.
700.	357.4	6	1.0	1.0	10000.0	.00	1.
800.	287.9	6	1.0	1.0	10000.0	.00	9.
900.	238.6	6	1.0	1.0	10000.0	.00	11.
1000.	202.3	6	1.0	1.0	10000.0	.00	35.
1100.	174.6	6	1.0	1.0	10000.0	.00	12.
1200.	152.8	6	1.0	1.0	10000.0	.00	29.
1300.	135.5	6	1.0	1.0	10000.0	.00	29.
1400.	121.3	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	109.6	6	1.0	1.0	10000.0	.00	29.
1600.	99.73	6	1.0	1.0	10000.0	.00	12.
1700.	91.36	6	1.0	1.0	10000.0	.00	29.
1800.	84.18	6	1.0	1.0	10000.0	.00	12.
1900.	77.96	6	1.0	1.0	10000.0	.00	20.
2000.	72.53	6	1.0	1.0	10000.0	.00	29.
2100.	67.75	6	1.0	1.0	10000.0	.00	43.
2200.	63.52	6	1.0	1.0	10000.0	.00	41.
2300.	59.74	6	1.0	1.0	10000.0	.00	41.
2400.	56.36	6	1.0	1.0	10000.0	.00	43.
2500.	53.32	6	1.0	1.0	10000.0	.00	43.
2600.	50.57	6	1.0	1.0	10000.0	.00	43.
2700.	48.07	6	1.0	1.0	10000.0	.00	41.
2800.	45.79	6	1.0	1.0	10000.0	.00	41.
2900.	43.70	6	1.0	1.0	10000.0	.00	43.
3000.	41.79	6	1.0	1.0	10000.0	.00	43.
3500.	34.18	6	1.0	1.0	10000.0	.00	43.
4000.	28.83	6	1.0	1.0	10000.0	.00	43.
4500.	24.87	6	1.0	1.0	10000.0	.00	5.
5000.	21.84	6	1.0	1.0	10000.0	.00	5.
5500.	19.45	6	1.0	1.0	10000.0	.00	5.
6000.	17.51	6	1.0	1.0	10000.0	.00	5.
6500.	15.92	6	1.0	1.0	10000.0	.00	5.
7000.	14.59	6	1.0	1.0	10000.0	.00	5.
7500.	13.46	6	1.0	1.0	10000.0	.00	5.
8000.	12.48	6	1.0	1.0	10000.0	.00	31.
8500.	11.64	6	1.0	1.0	10000.0	.00	39.
9000.	10.90	6	1.0	1.0	10000.0	.00	39.
9500.	10.25	6	1.0	1.0	10000.0	.00	39.
10000.	9.671	6	1.0	1.0	10000.0	.00	39.
15000.	6.164	6	1.0	1.0	10000.0	.00	39.
20000.	4.516	6	1.0	1.0	10000.0	.00	26.
25000.	3.561	6	1.0	1.0	10000.0	.00	26.
30000.	2.939	6	1.0	1.0	10000.0	.00	26.
40000.	2.178	6	1.0	1.0	10000.0	.00	44.
50000.	1.729	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	.2181E+06	6	1.0	1.0	10000.0	.00	45.

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR MAXIMUM CONCENTRATION

****
*** END OF SCREEN MODEL OUTPUT ***
****

04/17/01
08:16:49

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

216 Paterson Plank Road Site - Xylenes

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.630000E-04
SOURCE HEIGHT (M)	=	.0000
LENGTH OF LARGER SIDE (M)	=	13.0767
LENGTH OF SMALLER SIDE (M)	=	13.0767
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	MAX CONC (PPM)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	784.1	0.180889	15.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
15.	784.1	6	1.0	1.0	10000.0	.00	45.
100.	40.31	6	1.0	1.0	10000.0	.00	39.
200.	11.37	6	1.0	1.0	10000.0	.00	36.
300.	5.479	6	1.0	1.0	10000.0	.00	2.
400.	3.303	6	1.0	1.0	10000.0	.00	24.
500.	2.250	6	1.0	1.0	10000.0	.00	28.
600.	1.657	6	1.0	1.0	10000.0	.00	6.
700.	1.285	6	1.0	1.0	10000.0	.00	1.
800.	1.035	6	1.0	1.0	10000.0	.00	9.
900.	.8581	6	1.0	1.0	10000.0	.00	11.
1000.	.7273	6	1.0	1.0	10000.0	.00	35.
1100.	.6276	6	1.0	1.0	10000.0	.00	12.
1200.	.5496	6	1.0	1.0	10000.0	.00	29.
1300.	.4871	6	1.0	1.0	10000.0	.00	29.
1400.	.4362	6	1.0	1.0	10000.0	.00	12.

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1500.	.3940	6	1.0	1.0	10000.0	.00	29.
1600.	.3586	6	1.0	1.0	10000.0	.00	12.
1700.	.3285	6	1.0	1.0	10000.0	.00	29.
1800.	.3027	6	1.0	1.0	10000.0	.00	12.
1900.	.2803	6	1.0	1.0	10000.0	.00	20.
2000.	.2608	6	1.0	1.0	10000.0	.00	29.
2100.	.2436	6	1.0	1.0	10000.0	.00	43.
2200.	.2284	6	1.0	1.0	10000.0	.00	41.
2300.	.2148	6	1.0	1.0	10000.0	.00	41.
2400.	.2027	6	1.0	1.0	10000.0	.00	43.
2500.	.1917	6	1.0	1.0	10000.0	.00	43.
2600.	.1818	6	1.0	1.0	10000.0	.00	43.
2700.	.1728	6	1.0	1.0	10000.0	.00	41.
2800.	.1646	6	1.0	1.0	10000.0	.00	41.
2900.	.1571	6	1.0	1.0	10000.0	.00	43.
3000.	.1503	6	1.0	1.0	10000.0	.00	43.
3500.	.1229	6	1.0	1.0	10000.0	.00	43.
4000.	.1037	6	1.0	1.0	10000.0	.00	43.
4500.	.8944E-01	6	1.0	1.0	10000.0	.00	5.
5000.	.7853E-01	6	1.0	1.0	10000.0	.00	5.
5500.	.6992E-01	6	1.0	1.0	10000.0	.00	5.
6000.	.6297E-01	6	1.0	1.0	10000.0	.00	5.
6500.	.5724E-01	6	1.0	1.0	10000.0	.00	5.
7000.	.5245E-01	6	1.0	1.0	10000.0	.00	5.
7500.	.4838E-01	6	1.0	1.0	10000.0	.00	5.
8000.	.4489E-01	6	1.0	1.0	10000.0	.00	31.
8500.	.4186E-01	6	1.0	1.0	10000.0	.00	39.
9000.	.3920E-01	6	1.0	1.0	10000.0	.00	39.
9500.	.3686E-01	6	1.0	1.0	10000.0	.00	39.
10000.	.3478E-01	6	1.0	1.0	10000.0	.00	39.
15000.	.2216E-01	6	1.0	1.0	10000.0	.00	39.
20000.	.1624E-01	6	1.0	1.0	10000.0	.00	26.
25000.	.1280E-01	6	1.0	1.0	10000.0	.00	26.
30000.	.1057E-01	6	1.0	1.0	10000.0	.00	26.
40000.	.7831E-02	6	1.0	1.0	10000.0	.00	44.
50000.	.6217E-02	6	1.0	1.0	10000.0	.00	44.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 15. M:

15.	784.1	6	1.0	1.0	10000.0	.00	45.

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
MAX DIR = WIND DIRECTION RELATIVE TO LONG AXIS FOR MAXIMUM CONCENTRATION

****
*** END OF SCREEN MODEL OUTPUT ***
****

ATTACHMENT C-2

ISCST3 MODEL

1987 METEOROLOGICAL DATA

```
CO STARTING
CO TITLEONE 1987 Carlstadt, Vinyl Chloride Impacts from Excavation Site
CO TITLETWO Newark/Atlantic City Meteorology, 1987 - 1991 (3/29/91)
CO MODELOPT DFAULT CONC    URBAN  NOCMPL
CO AVERTIME PERIOD 8
CO POLLUTID OTHER
CO DCAYCOEF     .000000
CO RUNORNOT RUN
CO FINISHED

SO STARTING
** Source Location Cards:
**         SRCID SRCTYP      XS      YS       ZS
**                          (m)     (m)      (m)
** SOURCE ORIGIN ONLY USED FOR RECEPTOR PLACEMENT
SO LOCATION ORIGIN POINT      0.0    0.0      0.0
SO SRCPARAM ORIGIN 0.0  10  300 10.0 3.0

** SOURCE ORIGIN FOR AREAPOLY
**         SRCID SRCTYP      XS      YS       ZS
**                          (m)     (m)      (m)
SO LOCATION SRC1  AREAPOLY   56.05  0.0       0.0

** Source Parameter Cards:
** AREAPOLY SOURCE
**                 Q          RH      NoVert.   Sz(optional)
**       SRCID    (g/s/m2)    (m)     (#)       (m)
SO SRCPARAM SRC1  0.017521    0.00     5
SO AREAVERT SRC1   56.05  0.00   54.12  6.69   61.11  4.31
SO AREAVERT SRC1   65.72 -8.92   59.62 -14.12
SO EMISUNIT    .100000E+07 (GRAMS/SEC)          (MICROGRAMS/CUBIC-METER)
SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE GRIDPOLR POL STA
RE GRIDPOLR POL ORIG  0.0   0.0
RE GRIDPOLR POL DIST  150 200 300 400 500 600 700 800 900 1000
RE GRIDPOLR POL GDIR  36  10.00  10.00
RE GRIDPOLR POL END
**  FENCELINE RECEPTORS AT  25-M INTERVALS
RE DISCCART      -51.0      96.6
RE DISCCART      -30.1      83.0
RE DISCCART       -9.0      69.5
RE DISCCART       13.1      57.8
RE DISCCART       35.5      46.8
RE DISCCART       53.8      30.4
RE DISCCART       66.9       9.1
RE DISCCART       84.3      -8.7
RE DISCCART       75.1     -28.3
RE DISCCART       59.7     -48.0
```

```
RE DISCCART        44.2     -67.7
RE DISCCART        28.8     -87.4
RE DISCCART        13.4    -107.0
RE DISCCART        -2.0    -126.7
RE DISCCART       -19.6    -111.2
RE DISCCART       -37.3     -93.6
RE DISCCART       -54.9     -75.9
RE DISCCART       -60.2     -58.0
RE DISCCART       -78.5     -40.9
RE DISCCART       -96.1     -39.0
RE DISCCART      -113.9     -21.5
RE DISCCART      -126.5      -2.0
RE DISCCART      -111.9      18.0
RE DISCCART       -96.6      37.8
RE DISCCART       -81.3      57.6
RE DISCCART       -65.9      77.3
RE DISCPOLR ORIGIN        75.        10
RE DISCPOLR ORIGIN       100.        10
RE DISCPOLR ORIGIN        75.        20
RE DISCPOLR ORIGIN       100.        20
RE DISCPOLR ORIGIN        75.        30
RE DISCPOLR ORIGIN       100.        30
RE DISCPOLR ORIGIN        75.        40
RE DISCPOLR ORIGIN       100.        40
RE DISCPOLR ORIGIN        75.        50
RE DISCPOLR ORIGIN       100.        50
RE DISCPOLR ORIGIN        75.        60
RE DISCPOLR ORIGIN       100.        60
RE DISCPOLR ORIGIN        75.        70
RE DISCPOLR ORIGIN       100.        70
RE DISCPOLR ORIGIN        75.        80
RE DISCPOLR ORIGIN       100.        80
RE DISCPOLR ORIGIN       100.        90
RE DISCPOLR ORIGIN       100.       100
RE DISCPOLR ORIGIN       100.       110
RE DISCPOLR ORIGIN       100.       120
RE DISCPOLR ORIGIN       100.       130
RE DISCPOLR ORIGIN       100.       140
RE DISCPOLR ORIGIN       100.       150
RE DISCPOLR ORIGIN       100.       160
RE DISCPOLR ORIGIN       100.       210
RE DISCPOLR ORIGIN       100.       220
RE DISCPOLR ORIGIN       100.       230
RE DISCPOLR ORIGIN       100.       240
RE DISCPOLR ORIGIN       100.       310
RE DISCPOLR ORIGIN       100.       340
RE DISCPOLR ORIGIN        75.       350
RE DISCPOLR ORIGIN       100.       350
RE DISCPOLR ORIGIN        75.       360
RE DISCPOLR ORIGIN       100.       360
RE FINISHED
```

```
ME STARTING
ME INPUTFIL EWKACY87.MET
ME ANEMHGHT  20 FEET
ME SURFDATA  14734      1987       NEWARK
ME UAIRDATA  93755      1987       ATLANTIC_CITY
ME WINDCATS    1.54     3.09    5.14    8.23   10.80
ME FINISHED

OU STARTING
OU RECTABLE ALLAVE FIRST
OU PLOTFILE 8 ALL FIRST 08.P87
OU FINISHED

 *** Message Summary For ISC3 Model Setup ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of           0 Informational Message(s)

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
SO W320    17 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

***********************************
*** SETUP Finishes Successfully ***
***********************************
```

400228

*** MODEL SETUP OPTIONS SUMMARY ***

- -

**Simple Terrain Model is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

-- SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION. DDPLETE = F
**Model Uses NO WET DEPLETION. WDPLETE = F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
1. Final Plume Rise.
2. Stack-tip Downwash.
3. Buoyancy-induced Dispersion.
4. Use Calms Processing Routine.
5. Not Use Missing Data Processing Routine.
6. Default Wind Profile Exponents.
7. Default Vertical Potential Temperature Gradients.
8. "Upper Bound" Values for Supersquat Buildings.
9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates 1 Short Term Average(s) of: 8-HR
and Calculates PERIOD Averages

**This Run Includes: 2 Source(s); 1 Source Group(s); and 420 Receptor(s)

**The Model Assumes A Pollutant Type of: OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
Model Outputs Tables of PERIOD Averages by Receptor
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours

400229

b for Both Calm and Missing Hours

```
**Misc. Inputs:  Anem. Hgt. (m) =     6.10 ;    Decay Coef. =    0.000      ;    Rot. Angle =     0.0
                 Emission Units = (GRAMS/SEC)                               ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = (MICROGRAMS/CUBIC-METER)

**Approximate Storage Requirements of Model =     1.2 MB of RAM.

**Input Runstream File:          vinyl.i87
**Output Print File:             vinyl.087
```

400230

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BUILDING EXISTS	EMISSION RATE SCALAR VARY BY
ORIGIN	0	0.00000E+00	0.0	0.0	0.0	10.00	300.00	10.00	3.00	NO	

400231

**MODELOPTs:
CONC URBAN FLAT DFAULT NOCMPL

*** AREAPOLY SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS /METER**2)	LOCATION OF AREA X (METERS)	LOCATION OF AREA Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	NUMBER OF VERTS.	INIT. SZ (METERS)	EMISSION RATE SCALAR VARY BY
SRC1	0	0.17521E-01	56.0	0.0	0.0	0.00	5	0.00	

400232

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID	SOURCE IDs
ALL	ORIGIN , SRC1 ,

400233

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: POL   ; NETWORK TYPE: GRIDPOLR ***

*** ORIGIN FOR POLAR NETWORK ***
X-ORIG =   0.00 ;   Y-ORIG =   0.00 (METERS)

*** DISTANCE RANGES OF NETWORK ***
(METERS)

150.0,	200.0,	300.0,	400.0,	500.0,	600.0,	700.0,	800.0,	900.0,	1000.0,

*** DIRECTION RADIALS OF NETWORK ***
(DEGREES)

10.0,	20.0,	30.0,	40.0,	50.0,	60.0,	70.0,	80.0,	90.0,	100.0,
110.0,	120.0,	130.0,	140.0,	150.0,	160.0,	170.0,	180.0,	190.0,	200.0,
210.0,	220.0,	230.0,	240.0,	250.0,	260.0,	270.0,	280.0,	290.0,	300.0,
310.0,	320.0,	330.0,	340.0,	350.0,	360.0,				

400234

**MODELOPTs:
CONC URBAN FLAT DFAULT NOCMPL

*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZFLAG)
(METERS)

```
(    -51.0,     96.6,      0.0,      0.0);      (    -30.1,     83.0,      0.0,      0.0);
(     -9.0,     69.5,      0.0,      0.0);      (     13.1,     57.8,      0.0,      0.0);
(     35.5,     46.8,      0.0,      0.0);      (     53.8,     30.4,      0.0,      0.0);
(     66.9,      9.1,      0.0,      0.0);      (     84.3,     -8.7,      0.0,      0.0);
(     75.1,    -28.3,      0.0,      0.0);      (     59.7,    -48.0,      0.0,      0.0);
(     44.2,    -67.7,      0.0,      0.0);      (     28.8,    -87.4,      0.0,      0.0);
(     13.4,   -107.0,      0.0,      0.0);      (     -2.0,   -126.7,      0.0,      0.0);
(    -19.6,   -111.2,      0.0,      0.0);      (    -37.3,    -93.6,      0.0,      0.0);
(    -54.9,    -75.9,      0.0,      0.0);      (    -60.2,    -58.0,      0.0,      0.0);
(    -78.5,    -40.9,      0.0,      0.0);      (    -96.1,    -39.0,      0.0,      0.0);
(   -113.9,    -21.5,      0.0,      0.0);      (   -126.5,     -2.0,      0.0,      0.0);
(   -111.9,     18.0,      0.0,      0.0);      (    -96.6,     37.8,      0.0,      0.0);
(    -81.3,     57.6,      0.0,      0.0);      (    -65.9,     77.3,      0.0,      0.0);
```

400235

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** DISCRETE POLAR RECEPTORS ***
ORIGIN: (DIST, DIR, ZELEV, ZFLAG)
SRCID: (METERS,DEG,METERS,METERS)

```
ORIGIN  : (    75.0,    10.0,     0.0,     0.0);    ORIGIN  : (   100.0,    10.0,     0.0,     0.0);
ORIGIN  : (    75.0,    20.0,     0.0,     0.0);    ORIGIN  : (   100.0,    20.0,     0.0,     0.0);
ORIGIN  : (    75.0,    30.0,     0.0,     0.0);    ORIGIN  : (   100.0,    30.0,     0.0,     0.0);
ORIGIN  : (    75.0,    40.0,     0.0,     0.0);    ORIGIN  : (   100.0,    40.0,     0.0,     0.0);
ORIGIN  : (    75.0,    50.0,     0.0,     0.0);    ORIGIN  : (   100.0,    50.0,     0.0,     0.0);
ORIGIN  : (    75.0,    60.0,     0.0,     0.0);    ORIGIN  : (   100.0,    60.0,     0.0,     0.0);
ORIGIN  : (    75.0,    70.0,     0.0,     0.0);    ORIGIN  : (   100.0,    70.0,     0.0,     0.0);
ORIGIN  : (    75.0,    80.0,     0.0,     0.0);    ORIGIN  : (   100.0,    80.0,     0.0,     0.0);
ORIGIN  : (   100.0,    90.0,     0.0,     0.0);    ORIGIN  : (   100.0,   100.0,     0.0,     0.0);
ORIGIN  : (   100.0,   110.0,     0.0,     0.0);    ORIGIN  : (   100.0,   120.0,     0.0,     0.0);
ORIGIN  : (   100.0,   130.0,     0.0,     0.0);    ORIGIN  : (   100.0,   140.0,     0.0,     0.0);
ORIGIN  : (   100.0,   150.0,     0.0,     0.0);    ORIGIN  : (   100.0,   160.0,     0.0,     0.0);
ORIGIN  : (   100.0,   210.0,     0.0,     0.0);    ORIGIN  : (   100.0,   220.0,     0.0,     0.0);
ORIGIN  : (   100.0,   230.0,     0.0,     0.0);    ORIGIN  : (   100.0,   240.0,     0.0,     0.0);
ORIGIN  : (   100.0,   310.0,     0.0,     0.0);    ORIGIN  : (   100.0,   340.0,     0.0,     0.0);
ORIGIN  : (    75.0,   350.0,     0.0,     0.0);    ORIGIN  : (   100.0,   350.0,     0.0,     0.0);
ORIGIN  : (    75.0,   360.0,     0.0,     0.0);    ORIGIN  : (   100.0,   360.0,     0.0,     0.0);
```

400236

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

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1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
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1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
B	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
C	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00
D	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00
E	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00
F	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01

F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: EWKACY87.MET
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.: 14734 UPPER AIR STATION NO.: 93755
NAME: NEWARK NAME: ATLANTIC_CITY
YEAR: 1987 YEAR: 1987

YR	MN	DY	HR	FLOW VECTOR	SPEED (M/S)	TEMP (K)	STAB CLASS	MIXING HEIGHT (M) RURAL	MIXING HEIGHT (M) URBAN	USTAR (M/S)	M-O LENGTH (M)	Z-0 (M)	IPCODE	PRATE (mm/HR)
87	01	01	01	191.0	3.60	273.1	5	770.8	133.0	0.0000	0.0	0.0000	0	0.00
87	01	01	02	198.0	4.12	272.6	5	718.3	133.0	0.0000	0.0	0.0000	0	0.00
87	01	01	03	194.0	4.12	272.0	5	665.9	133.0	0.0000	0.0	0.0000	0	0.00
87	01	01	04	203.0	4.12	272.0	4	613.4	613.4	0.0000	0.0	0.0000	0	0.00
87	01	01	05	203.0	3.09	271.5	5	561.0	133.0	0.0000	0.0	0.0000	0	0.00
87	01	01	06	232.0	3.60	271.5	4	508.6	508.6	0.0000	0.0	0.0000	0	0.00
87	01	01	07	195.0	3.09	270.9	5	456.1	133.0	0.0000	0.0	0.0000	0	0.00
87	01	01	08	213.0	4.12	271.5	4	7.7	129.2	0.0000	0.0	0.0000	0	0.00
87	01	01	09	197.0	4.12	272.0	4	21.2	122.5	0.0000	0.0	0.0000	0	0.00
87	01	01	10	211.0	4.12	272.6	4	34.8	115.8	0.0000	0.0	0.0000	0	0.00
87	01	01	11	224.0	4.63	273.7	4	48.3	109.1	0.0000	0.0	0.0000	0	0.00
87	01	01	12	196.0	5.14	274.3	4	61.9	102.4	0.0000	0.0	0.0000	0	0.00
87	01	01	13	213.0	5.66	274.8	4	75.4	95.7	0.0000	0.0	0.0000	0	0.00
87	01	01	14	199.0	5.66	274.8	4	89.0	89.0	0.0000	0.0	0.0000	0	0.00
87	01	01	15	212.0	5.14	275.9	4	89.0	89.0	0.0000	0.0	0.0000	0	0.00
87	01	01	16	214.0	5.66	275.9	4	89.0	89.0	0.0000	0.0	0.0000	0	0.00
87	01	01	17	201.0	4.12	274.3	4	103.3	103.3	0.0000	0.0	0.0000	0	0.00
87	01	01	18	207.0	5.14	273.7	4	136.4	136.4	0.0000	0.0	0.0000	0	0.00
87	01	01	19	214.0	6.17	273.1	4	169.6	169.6	0.0000	0.0	0.0000	0	0.00
87	01	01	20	217.0	5.66	273.1	4	202.7	202.7	0.0000	0.0	0.0000	0	0.00
87	01	01	21	210.0	6.17	273.1	4	235.8	235.8	0.0000	0.0	0.0000	0	0.00
87	01	01	22	212.0	6.69	273.7	4	269.0	269.0	0.0000	0.0	0.0000	0	0.00
87	01	01	23	210.0	7.72	273.7	4	302.1	302.1	0.0000	0.0	0.0000	0	0.00
87	01	01	24	210.0	7.72	273.7	4	335.2	335.2	0.0000	0.0	0.0000	0	0.00

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

400239

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 150.00	200.00	300.00	400.00	500.00	600.00	700.00	800.00	900.00
10.00	26.90530	15.87446	7.78147	4.68223	3.15719	2.29259	1.75296	1.39194	1.13784
20.00	30.86471	18.83643	9.35627	5.74048	3.93532	2.89357	2.23319	1.78630	1.46912
30.00	39.36712	24.96648	13.00325	8.01949	5.47650	4.00509	3.07650	2.45051	2.00821
40.00	58.63019	37.56107	18.32714	10.67483	6.99655	4.96717	3.73122	2.92185	2.36139
50.00	93.03879	51.22214	20.47962	10.88272	6.79944	4.68983	3.45721	2.67052	2.13708
60.00	114.85947	51.09679	17.74275	8.88449	5.35830	3.60795	2.61026	1.98856	1.57259
70.00	99.38597	39.38798	13.58624	7.01933	4.34175	2.97968	2.18793	1.68611	1.34642
80.00	86.61028	36.75558	12.96566	6.67706	4.11224	2.81070	2.05642	1.57832	1.25562
90.00	89.73006	38.24921	13.63113	7.07321	4.38698	3.01859	2.22315	1.71703	1.37419
100.00	71.74188	30.18234	10.65608	5.49198	3.38197	2.30970	1.68829	1.29413	1.02763
110.00	74.92877	31.55065	11.13377	5.74153	3.54179	2.42435	1.77687	1.36626	1.08888
120.00	72.26204	33.47116	12.14525	6.26710	3.85711	2.63386	1.92605	1.47867	1.17614
130.00	50.04806	27.39686	11.54830	6.31687	4.00268	2.78100	2.05675	1.59112	1.27350
140.00	34.43435	19.46479	8.84649	5.07577	3.31611	2.35194	1.76637	1.38098	1.11427
150.00	33.14653	15.67404	6.79989	3.93172	2.59069	1.85030	1.39496	1.09521	0.88612
160.00	43.80918	18.74474	6.67795	3.55361	2.25700	1.58110	1.18035	0.92151	0.74230
170.00	53.57973	26.19545	9.33422	4.71439	2.86128	1.93678	1.40844	1.07644	0.85328
180.00	45.52129	29.85748	13.07300	6.99252	4.33470	2.96186	2.16423	1.65841	1.31762
190.00	27.78548	21.72048	12.90366	8.08813	5.46795	3.93855	2.98014	2.34215	1.89733
200.00	17.65712	12.93805	8.09873	5.56027	4.06041	3.10743	2.46648	2.01484	1.68433
210.00	13.88439	9.31485	5.14336	3.34839	2.38833	1.80664	1.42428	1.15867	0.96671
220.00	11.34434	7.73752	4.22803	2.66580	1.84255	1.35698	1.04688	0.83643	0.68651
230.00	9.21894	6.27914	3.47594	2.22398	1.55570	1.15642	0.89839	0.72158	0.59545
240.00	7.67786	5.20977	2.86049	1.82131	1.27116	0.94353	0.73288	0.58905	0.48629
250.00	6.21785	4.22120	2.33476	1.49617	1.04919	0.78225	0.60998	0.49244	0.40820
260.00	5.45830	3.57869	1.90081	1.18990	0.82177	0.60589	0.46865	0.37591	0.31033
270.00	6.09304	4.00092	2.12490	1.33097	0.92052	0.68048	0.52777	0.42475	0.35185
280.00	7.21787	4.80505	2.59730	1.64561	1.14856	0.85526	0.66715	0.53917	0.44775
290.00	8.47610	5.72144	3.14825	2.01617	1.41574	1.05860	0.82773	0.66980	0.55698
300.00	10.87863	7.49893	4.19817	2.70423	1.90252	1.42291	1.11202	0.89924	0.74668
310.00	13.43640	9.00696	4.84338	3.04528	2.10916	1.55908	1.20760	0.96871	0.79883
320.00	14.97619	9.83212	5.20528	3.25055	2.24050	1.64959	1.27255	1.01672	0.83574
330.00	16.54109	10.81701	5.68829	3.52629	2.41421	1.76669	1.35723	1.08082	0.88427
340.00	18.61751	11.93202	6.08225	3.72937	2.54996	1.87098	1.44066	1.14961	0.94609
350.00	20.71419	13.20245	6.80495	4.14142	2.79100	2.01722	1.53510	1.21412	0.98817
360.00	24.10653	14.92314	7.06948	4.17184	2.79835	2.03011	1.55343	1.23494	1.01022

400240

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 1000.00
10.00	0.95157
20.00	1.23465
30.00	1.68304
40.00	1.95730
50.00	1.75740
60.00	1.27994
70.00	1.10483
80.00	1.02639
90.00	1.13024
100.00	0.83887
110.00	0.89229
120.00	0.96195
130.00	1.04608
140.00	0.92137
150.00	0.73480
160.00	0.61407
170.00	0.69640
180.00	1.07601
190.00	1.57343
200.00	1.43420
210.00	0.82209
220.00	0.57654
230.00	0.50166
240.00	0.41040
250.00	0.34576
260.00	0.26226
270.00	0.29826
280.00	0.38015
290.00	0.47313
300.00	0.63272
310.00	0.67370
320.00	0.70129
330.00	0.74031
340.00	0.79391
350.00	0.82227
360.00	0.84562

400241

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
-51.00	96.60	26.04617	-30.10	83.00	37.38899
-9.00	69.50	58.32685	13.10	57.80	101.36324
35.50	46.80	200.01181	53.80	30.40	552.68616
66.90	9.10	5498.57910	84.30	-8.70	1028.47290
75.10	-28.30	747.77838	59.70	-48.00	371.27002
44.20	-67.70	262.17859	28.80	-87.40	143.22937
13.40	-107.00	80.93237	-2.00	-126.70	49.94859
-19.60	-111.20	33.38226	-37.30	-93.60	26.47493
-54.90	-75.90	20.94481	-60.20	-58.00	19.12792
-78.50	-40.90	13.31271	-96.10	-39.00	10.12894
-113.90	-21.50	7.77676	-126.50	-2.00	7.59096
-111.90	18.00	10.28016	-96.60	37.80	13.70775
-81.30	57.60	19.63044	-65.90	77.30	24.74475

400242

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE POLAR RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC	ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC
ORIGIN :	75.00	10.00	74.79144	ORIGIN :	100.00	10.00	52.27094
ORIGIN :	75.00	20.00	94.18469	ORIGIN :	100.00	20.00	63.23107
ORIGIN :	75.00	30.00	124.24686	ORIGIN :	100.00	30.00	76.29012
ORIGIN :	75.00	40.00	163.33441	ORIGIN :	100.00	40.00	104.20979
ORIGIN :	75.00	50.00	239.73300	ORIGIN :	100.00	50.00	167.79250
ORIGIN :	75.00	60.00	428.18610	ORIGIN :	100.00	60.00	317.18335
ORIGIN :	75.00	70.00	1066.13318	ORIGIN :	100.00	70.00	470.02127
ORIGIN :	75.00	80.00	2387.44702	ORIGIN :	100.00	80.00	433.74527
ORIGIN :	100.00	90.00	430.92447	ORIGIN :	100.00	100.00	358.44708
ORIGIN :	100.00	110.00	341.98755	ORIGIN :	100.00	120.00	200.20871
ORIGIN :	100.00	130.00	117.23995	ORIGIN :	100.00	140.00	113.26350
ORIGIN :	100.00	150.00	134.49623	ORIGIN :	100.00	160.00	134.21613
ORIGIN :	100.00	210.00	22.33094	ORIGIN :	100.00	220.00	17.99646
ORIGIN :	100.00	230.00	14.86323	ORIGIN :	100.00	240.00	12.34157
ORIGIN :	100.00	310.00	21.67765	ORIGIN :	100.00	340.00	32.18333
ORIGIN :	75.00	350.00	52.07675	ORIGIN :	100.00	350.00	37.26200
ORIGIN :	75.00	360.00	62.05600	ORIGIN :	100.00	360.00	43.12749

400243

*** ISCST3 - VERSION 00101 *** *** 1987 Carlstadt, Vinyl Chloride Impacts from Excavation Site *** 04/17/01
*** Newark/Atlantic City Meteorology, 1987 - 1991 (3/29/91) *** 07:59:37
**MODELOPTs: PAGE 14
CONC URBAN FLAT DFAULT NOCMPL

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 150.00	200.00	300.00	400.00	500.00
10.0	933.60663c(87110124)	403.54587c(87110124)	173.05267 (87120324)	109.89396 (87081424)	74.97250 (87081424)
20.0	683.97748 (87090424)	417.07642 (87081424)	194.89386 (87010924)	107.57196c(87032508)	75.05387c(87032508)
30.0	850.26880 (87010924)	446.98141c(87032508)	294.41025 (87020624)	161.04356 (87020624)	97.86092c(87103008)
40.0	1244.61597 (87020624)	638.84052c(87103008)	291.14667 (87121008)	164.14552 (87030908)	106.06036 (87030908)
50.0	1392.84863 (87121008)	791.29688 (87100208)	386.55853 (87100208)	195.64873 (87100208)	115.39164 (87100208)
60.0	2023.55957 (87100208)	847.73926c(87111524)	277.60358c(87111524)	130.63200c(87092208)	82.33344 (87103024)
70.0	1265.49402 (87103024)	550.10590c(87070908)	282.23285c(87070908)	171.64716c(87070908)	115.46993c(87070908)
80.0	1991.73279c(87070908)	749.86810c(87070908)	245.27045 (87021124)	126.82540 (87021124)	78.30824 (87021124)
90.0	2249.70947 (87122808)	997.34540 (87122808)	367.76248 (87041208)	196.61223 (87041208)	124.85104 (87041208)
100.0	1315.12708c(87112424)	637.17383c(87112424)	251.49907c(87112424)	137.06696c(87112424)	87.67890c(87112424)
110.0	1291.38440 (87090124)	604.28149 (87090124)	222.72903 (87090124)	116.79065 (87090124)	72.98305 (87090124)
120.0	1337.92957 (87091008)	570.74487 (87083008)	219.40881 (87083008)	103.10351 (87083008)	64.23585 (87090124)
130.0	1371.60864 (87090924)	664.39923 (87090924)	264.61472 (87091008)	131.82436 (87091008)	75.82851 (87091008)
140.0	926.47223 (87082008)	461.23792 (87082008)	257.83368 (87090924)	155.10661 (87090924)	98.71495 (87090924)
150.0	672.06396 (87091424)	387.87436 (87082008)	192.34103 (87082008)	109.81179 (87082008)	69.40188 (87082008)
160.0	832.23236c(87091408)	434.82230 (87082608)	147.94933 (87091424)	87.04285 (87082008)	59.96284 (87082008)
170.0	1026.82800c(87101608)	498.98917 (87091108)	188.77536c(87091408)	112.81418 (87082608)	72.64895 (87082608)
180.0	1056.80896c(87110108)	632.54333 (87101708)	263.92734c(87101608)	142.51772 (87091108)	87.95227 (87091108)
190.0	544.67029 (87101908)	528.09998c(87110108)	298.68069c(87110108)	180.67482 (87101708)	122.76654 (87101708)
200.0	326.26953c(87050624)	279.96259 (87103124)	168.52867c(87110108)	135.73106c(87110108)	105.38116c(87110108)
210.0	548.59686c(87101624)	242.47664c(87101624)	105.74255c(87050624)	74.73055 (87103124)	57.37011 (87103124)
220.0	526.57404c(87101624)	395.99442c(87101624)	197.12450c(87101624)	108.49393c(87101624)	66.74155c(87101624)
230.0	282.07349 (87112524)	189.91660 (87112524)	142.56119c(87101624)	108.65427c(87101624)	83.50271c(87101624)
240.0	327.61407 (87112524)	202.12260 (87112524)	98.96428 (87112524)	60.11479 (87112524)	41.32650 (87112524)
250.0	274.53894 (87112524)	203.69830 (87112524)	121.60144 (87112524)	80.62737 (87112524)	57.71800 (87112524)
260.0	184.36621 (87041524)	125.30550 (87041524)	69.11575 (87041524)	44.26480 (87041524)	33.30693 (87062624)
270.0	250.00604 (87051408)	165.81561 (87051408)	89.69980 (87051408)	57.08623 (87051408)	39.99271 (87051408)
280.0	298.05029 (87051408)	198.72656 (87051324)	112.01186 (87051324)	73.19727 (87051324)	52.32903 (87051324)
290.0	270.30698c(87060408)	178.76440c(87060408)	94.96527c(87060408)	59.97089c(87060408)	43.16159c(87060408)
300.0	336.01239 (87070524)	251.58539 (87070524)	148.05823 (87070524)	96.22066 (87070524)	67.72580 (87070524)
310.0	381.76248 (87062024)	249.38686 (87070608)	124.40520 (87070608)	71.19263 (87070608)	49.73733 (87081308)
320.0	313.21179 (87081308)	222.35091 (87042124)	139.52946 (87042124)	92.86860 (87042124)	66.16407 (87042124)
330.0	447.21320 (87042124)	299.31888 (87042124)	201.19525 (87090524)	133.23331 (87090524)	91.92037 (87090524)
340.0	641.15076 (87090524)	391.43677 (87090524)	158.54640c(87111524)	99.00228c(87111524)	75.00620c(87110124)
350.0	512.83154c(87111524)	381.08792c(87110124)	244.13930c(87110124)	153.72609c(87110124)	105.58808c(87110124)
360.0	818.99823c(87110124)	538.90588c(87110124)	245.59059c(87110124)	126.27814c(87110124)	72.24601c(87110124)

400244

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 600.00	700.00	800.00	900.00	1000.00
10.0	55.60753 (87010924)	43.01455 (87010924)	34.29576 (87010924)	27.99473 (87010924)	23.42797 (87010924)
20.0	58.19837 (87020624)	48.89289 (87020624)	41.40556 (87020624)	35.49717 (87020624)	30.73586 (87020624)
30.0	73.18408c(87103008)	56.54987c(87103008)	45.01669c(87103008)	36.78861c(87103008)	30.70298c(87103008)
40.0	80.67368 (87100208)	65.16193 (87100208)	53.59124 (87100208)	44.85844 (87100208)	38.23537 (87100208)
50.0	80.19791c(87111524)	61.42304c(87111524)	48.83651c(87111524)	39.98695c(87111524)	33.43822c(87111524)
60.0	57.95744 (87103024)	43.09896 (87103024)	33.50753 (87103024)	26.92651 (87103024)	22.19584 (87103024)
70.0	83.59500c(87070908)	63.79686c(87070908)	50.61684c(87070908)	41.43848c(87070908)	34.71309c(87070908)
80.0	53.77138 (87021124)	39.56031 (87021124)	30.56844 (87021124)	24.46520 (87021124)	20.14564 (87021124)
90.0	87.67551 (87041208)	65.74829 (87041208)	51.62452 (87041208)	41.94183 (87041208)	34.98863 (87041208)
100.0	61.77424c(87112424)	46.26575c(87112424)	36.29414c(87112424)	29.35256c(87112424)	24.40068c(87112424)
110.0	50.59385 (87090124)	37.54181 (87090124)	29.17393 (87090124)	23.51603 (87090124)	19.45386 (87090124)
120.0	46.50126 (87090124)	35.44777 (87090124)	28.05673 (87090124)	22.87350 (87090124)	19.08358 (87090124)
130.0	48.56003 (87091008)	34.23996 (87111424)	27.40740 (87111424)	22.51051 (87111424)	18.89585 (87111424)
140.0	67.81149 (87090924)	49.32976 (87090924)	37.53275 (87090924)	29.59902 (87090924)	24.14416 (87090924)
150.0	47.36354 (87082008)	34.20358 (87082008)	26.02764 (87082008)	21.58743 (87090924)	18.95381 (87090924)
160.0	43.84517 (87082008)	33.70810 (87082008)	26.95944 (87082008)	21.92467 (87082008)	18.56262 (87082008)
170.0	49.62222 (87082608)	35.66829 (87082608)	26.64297 (87082608)	20.56905 (87082608)	16.69156 (87091424)
180.0	60.69840c(87111608)	46.16372c(87091408)	36.84589c(87091408)	30.06807c(87091408)	25.04510c(87091408)
190.0	86.92605 (87101708)	64.27475 (87101708)	50.73038c(87101608)	42.26307c(87101608)	35.82619c(87101608)
200.0	82.88066c(87110108)	66.76458c(87110108)	54.91904c(87110108)	45.94174c(87110108)	39.23765c(87110108)
210.0	44.81902 (87103124)	35.86829 (87101908)	29.75456 (87101908)	25.14102 (87101908)	21.54780 (87101908)
220.0	44.65765c(87101624)	31.81297c(87101624)	23.74474c(87101624)	18.40041c(87101624)	14.69991c(87101624)
230.0	65.73529c(87101624)	53.19413c(87101624)	43.98355c(87101624)	37.18040c(87101624)	31.85302c(87101624)
240.0	30.53594 (87112524)	23.72675 (87112524)	19.10214 (87112524)	16.42676 (87062624)	14.83064 (87062624)
250.0	43.62908 (87112524)	34.38089 (87112524)	27.97005 (87112524)	23.30256 (87112524)	19.81073 (87112524)
260.0	27.01702 (87062624)	22.87676 (87062624)	19.91029 (87062624)	17.69198 (87062624)	15.99183 (87062624)
270.0	29.83550 (87051408)	23.27426 (87051408)	18.75748 (87051408)	15.51328 (87051408)	13.44427 (87062624)
280.0	39.74301 (87051324)	31.48856 (87051324)	25.75256 (87051324)	21.57990 (87051324)	18.86303c(87060408)
290.0	34.23728c(87060408)	28.95077c(87060408)	25.34381c(87060408)	22.65099c(87060408)	20.56312c(87060408)
300.0	50.53592 (87070524)	39.36198 (87070524)	31.70897 (87070524)	26.19668 (87070524)	22.03485 (87070524)
310.0	36.93867 (87081308)	28.60524 (87081308)	22.88293 (87081308)	20.08461 (87060324)	18.39923 (87060324)
320.0	49.70391 (87042124)	38.89468 (87042124)	31.38205 (87042124)	25.98933 (87042124)	21.93162 (87042124)
330.0	66.49507 (87090524)	50.27314 (87090524)	39.31708 (87090524)	31.61787 (87090524)	25.91825 (87090524)
340.0	60.59838c(87110124)	49.63948c(87110124)	41.25730c(87110124)	35.02150c(87110124)	30.10755c(87110124)
350.0	77.16862c(87110124)	59.41918c(87110124)	47.44512c(87110124)	39.08035c(87110124)	32.59710c(87110124)
360.0	49.64362 (87090424)	39.58121 (87090424)	32.26055 (87090424)	26.71644 (87090424)	22.53798 (87090424)

**MODELOPTs:
CONC URBAN FLAT DFAULT NOCMPL

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
-51.00	96.60	642.83887	(87042124)	-30.10	83.00	967.48096	(87042124)
-9.00	69.50	1543.55737	(87042124)	13.10	57.80	3271.84839	(87090524)
35.50	46.80	4965.50732c	(87110124)	53.80	30.40	15644.44530c	(87110124)
66.90	9.10	49804.18750	(87100208)	84.30	-8.70	13716.51860c	(87112424)
75.10	-28.30	17048.00980	(87090924)	59.70	-48.00	7043.24561	(87082608)
44.20	-67.70	4974.64648	(87101708)	28.80	-87.40	3001.56812c	(87110108)
13.40	-107.00	1898.95105c	(87110108)	-2.00	-126.70	1162.47571c	(87110108)
-19.60	-111.20	663.92627	(87103124)	-37.30	-93.60	1041.58508c	(87101624)
-54.90	-75.90	710.95972c	(87101624)	-60.20	-58.00	652.89319	(87112524)
-78.50	-40.90	603.07654	(87112524)	-96.10	-39.00	419.34708	(87112524)
-113.90	-21.50	254.46173	(87041524)	-126.50	-2.00	293.77548	(87051408)
-111.90	18.00	442.53357	(87051408)	-96.60	37.80	439.53525c	(87060408)
-81.30	57.60	612.53320	(87070524)	-65.90	77.30	631.90887	(87070608)

400246

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*** ISCST3 - VERSION 00101 ***     *** 1987 Carlstadt, Vinyl Chloride Impacts from Excavation Site          ***        04/17/01
                                   *** Newark/Atlantic City Meteorology, 1987 - 1991 (3/29/91)               ***        07:59:37
**MODELOPTs:                                                                                                            PAGE  17
CONC                         URBAN  FLAT          DFAULT                                                   NOCMPL

                             *** THE   1ST HIGHEST  8-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                 INCLUDING SOURCE(S):        ORIGIN   , SRC1     ,

                                              *** DISCRETE POLAR RECEPTOR POINTS ***

                                    ** CONC OF OTHER    IN (MICROGRAMS/CUBIC-METER)                      **
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ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC	(YYMMDDHH)	ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC	(YYMMDDHH)
ORIGIN :	75.00	10.00	1914.58142	(87090524)	ORIGIN :	100.00	10.00	1670.91211c	(87110124)
ORIGIN :	75.00	20.00	2623.99121c	(87110124)	ORIGIN :	100.00	20.00	2215.56665c	(87110124)
ORIGIN :	75.00	30.00	4287.70215c	(87110124)	ORIGIN :	100.00	30.00	1685.97461c	(87110124)
ORIGIN :	75.00	40.00	5128.07813c	(87110124)	ORIGIN :	100.00	40.00	2227.73853	(87010924)
ORIGIN :	75.00	50.00	4789.76563	(87090424)	ORIGIN :	100.00	50.00	2980.25732	(87020624)
ORIGIN :	75.00	60.00	7929.93164	(87010924)	ORIGIN :	100.00	60.00	4737.88037c	(87103008)
ORIGIN :	75.00	70.00	14270.62600	(87020624)	ORIGIN :	100.00	70.00	7542.67236	(87100208)
ORIGIN :	75.00	80.00	28245.38090	(87100208)	ORIGIN :	100.00	80.00	6745.49219c	(87070908)
ORIGIN :	100.00	90.00	7938.49023	(87122808)	ORIGIN :	100.00	100.00	5371.34277	(87120708)
ORIGIN :	100.00	110.00	4883.08936	(87083008)	ORIGIN :	100.00	120.00	5048.42871	(87090924)
ORIGIN :	100.00	130.00	2948.89575	(87082008)	ORIGIN :	100.00	140.00	2480.70776	(87082608)
ORIGIN :	100.00	150.00	2397.94800	(87091108)	ORIGIN :	100.00	160.00	2694.27637	(87101708)
ORIGIN :	100.00	210.00	1051.67578c	(87101624)	ORIGIN :	100.00	220.00	518.70325	(87112524)
ORIGIN :	100.00	230.00	517.81824	(87112524)	ORIGIN :	100.00	240.00	569.90790	(87112524)
ORIGIN :	100.00	310.00	689.60925	(87070524)	ORIGIN :	100.00	340.00	865.13574	(87042124)
ORIGIN :	75.00	350.00	1382.93140	(87042124)	ORIGIN :	100.00	350.00	1257.86743	(87090524)
ORIGIN :	75.00	360.00	2048.02393	(87090524)	ORIGIN :	100.00	360.00	1029.91309c	(87111524)

400247

*** THE SUMMARY OF MAXIMUM PERIOD (8760 HRS) RESULTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZFLAG)				OF TYPE	NETWORK GRID-ID
ALL	1ST HIGHEST VALUE IS	5498.57910 AT (	66.90,	9.10,	0.00,	0.00)	DC	NA
	2ND HIGHEST VALUE IS	2387.44702 AT (	73.86,	13.02,	0.00,	0.00)	DP	NA
	3RD HIGHEST VALUE IS	1066.13318 AT (	70.48,	25.65,	0.00,	0.00)	DP	NA
	4TH HIGHEST VALUE IS	1028.47290 AT (	84.30,	-8.70,	0.00,	0.00)	DC	NA
	5TH HIGHEST VALUE IS	747.77838 AT (	75.10,	-28.30,	0.00,	0.00)	DC	NA
	6TH HIGHEST VALUE IS	552.68616 AT (	53.80,	30.40,	0.00,	0.00)	DC	NA
	7TH HIGHEST VALUE IS	470.02127 AT (	93.97,	34.20,	0.00,	0.00)	DP	NA
	8TH HIGHEST VALUE IS	433.74527 AT (	98.48,	17.36,	0.00,	0.00)	DP	NA
	9TH HIGHEST VALUE IS	430.92447 AT (	100.00,	0.00,	0.00,	0.00)	DP	NA
	10TH HIGHEST VALUE IS	428.18610 AT (	64.95,	37.50,	0.00,	0.00)	DP	NA

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

400248

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	49804.18750	ON 87100208:	AT (66.90, 9.10, 0.00, 0.00)	DC	NA

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

400249

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*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of          0 Fatal Error Message(s)
A Total of          1 Warning Message(s)
A Total of        214 Informational Message(s)

A Total of        214 Calm Hours Identified


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********  WARNING MESSAGES  ********
SO W320    17 PPARM :Input Parameter May Be Out-of-Range for Parameter      QS

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
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400250

1988 METEOROLOGICAL DATA

```
CO STARTING
CO TITLEONE 1988 Carlstadt, Vinyl Chloride Impacts from Excavation Site
CO TITLETWO Newark/Atlantic City Meteorology, 1987 - 1991 (3/29/91)
CO MODELOPT DFAULT CONC   URBAN  NOCMPL
CO AVERTIME PERIOD 8
CO POLLUTID OTHER
CO DCAYCOEF     .000000
CO RUNORNOT RUN
CO FINISHED

SO STARTING
** Source Location Cards:
**          SRCID SRCTYP      XS      YS       ZS
**                           (m)     (m)      (m)
** SOURCE ORIGIN ONLY USED FOR RECEPTOR PLACEMENT
SO LOCATION ORIGIN POINT      0.0    0.0       0.0
SO SRCPARAM ORIGIN 0.0  10   300 10.0 3.0

** SOURCE ORIGIN FOR AREAPOLY
**          SRCID SRCTYP      XS      YS       ZS
**                           (m)     (m)      (m)
SO LOCATION SRC1  AREAPOLY   56.05  0.0       0.0

** Source Parameter Cards:
** AREAPOLY SOURCE
**                 Q          RH      NoVert.   Sz(optional)
**      SRCID    (g/s/m2)    (m)      (#)       (m)
SO SRCPARAM SRC1  0.017521    0.00     5
SO AREAVERT SRC1   56.05  0.00   54.12  6.69   61.11  4.31
SO AREAVERT SRC1   65.72 -8.92   59.62 -14.12
SO EMISUNIT    .100000E+07 (GRAMS/SEC)          (MICROGRAMS/CUBIC-METER)
SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE GRIDPOLR POL STA
RE GRIDPOLR POL ORIG  0.0   0.0
RE GRIDPOLR POL DIST  150 200 300 400 500 600 700 800 900 1000
RE GRIDPOLR POL GDIR  36  10.00  10.00
RE GRIDPOLR POL END
**  FENCELINE RECEPTORS AT  25-M INTERVALS
RE DISCCART      -51.0       96.6
RE DISCCART      -30.1       83.0
RE DISCCART       -9.0       69.5
RE DISCCART       13.1       57.8
RE DISCCART       35.5       46.8
RE DISCCART       53.8       30.4
RE DISCCART       66.9        9.1
RE DISCCART       84.3       -8.7
RE DISCCART       75.1      -28.3
RE DISCCART       59.7      -48.0
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400252

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RE DISCCART       44.2     -67.7
RE DISCCART       28.8     -87.4
RE DISCCART       13.4    -107.0
RE DISCCART       -2.0    -126.7
RE DISCCART      -19.6    -111.2
RE DISCCART      -37.3     -93.6
RE DISCCART      -54.9     -75.9
RE DISCCART      -60.2     -58.0
RE DISCCART      -78.5     -40.9
RE DISCCART      -96.1     -39.0
RE DISCCART     -113.9     -21.5
RE DISCCART     -126.5      -2.0
RE DISCCART     -111.9      18.0
RE DISCCART      -96.6      37.8
RE DISCCART .    -81.3      57.6
RE DISCCART      -65.9      77.3
RE DISCPOLR ORIGIN       75.        10
RE DISCPOLR ORIGIN      100.       10
RE DISCPOLR ORIGIN       75.        20
RE DISCPOLR ORIGIN      100.        20
RE DISCPOLR ORIGIN       75.        30
RE DISCPOLR ORIGIN      100.        30
RE DISCPOLR ORIGIN       75.        40
RE DISCPOLR ORIGIN      100.        40
RE DISCPOLR ORIGIN       75.        50
RE DISCPOLR ORIGIN      100.        50
RE DISCPOLR ORIGIN       75.        60
RE DISCPOLR ORIGIN      100.        60
RE DISCPOLR ORIGIN       75.        70
RE DISCPOLR ORIGIN      100.        70
RE DISCPOLR ORIGIN       75.        80
RE DISCPOLR ORIGIN      100.        80
RE DISCPOLR ORIGIN      100.        90
RE DISCPOLR ORIGIN      100.       100
RE DISCPOLR ORIGIN      100.       110
RE DISCPOLR ORIGIN      100.       120
RE DISCPOLR ORIGIN      100.       130
RE DISCPOLR ORIGIN      100.       140
RE DISCPOLR ORIGIN      100.       150
RE DISCPOLR ORIGIN      100.       160
RE DISCPOLR ORIGIN      100.       210
RE DISCPOLR ORIGIN      100.       220
RE DISCPOLR ORIGIN      100.       230
RE DISCPOLR ORIGIN      100.       240
RE DISCPOLR ORIGIN      100.       310
RE DISCPOLR ORIGIN      100.       340
RE DISCPOLR ORIGIN       75.       350
RE DISCPOLR ORIGIN      100.       350
RE DISCPOLR ORIGIN       75.       360
RE DISCPOLR ORIGIN      100.       360
RE FINISHED
```

```
ME STARTING
ME INPUTFIL EWKACY88.MET
ME ANEMHGHT  20 FEET
ME SURFDATA  14734      1988        NEWARK
ME UAIRDATA  93755      1988        ATLANTIC_CITY
ME WINDCATS    1.54     3.09     5.14     8.23    10.80
ME FINISHED

OU STARTING
OU RECTABLE ALLAVE FIRST
OU PLOTFILE 8 ALL FIRST 08.P88
OU FINISHED

 *** Message Summary For ISC3 Model Setup ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of           0 Informational Message(s)

   ******** FATAL ERROR MESSAGES ********
              ***   NONE   ***

   ********   WARNING MESSAGES   ********
SO W320    17 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

***********************************
*** SETUP Finishes Successfully ***
***********************************
```

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** MODEL SETUP OPTIONS SUMMARY ***

- -

**Simple Terrain Model is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

-- SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION. DDPLETE = F
**Model Uses NO WET DEPLETION. WDPLETE = F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
1. Final Plume Rise.
2. Stack-tip Downwash.
3. Buoyancy-induced Dispersion.
4. Use Calms Processing Routine.
5. Not Use Missing Data Processing Routine.
6. Default Wind Profile Exponents.
7. Default Vertical Potential Temperature Gradients.
8. "Upper Bound" Values for Supersquat Buildings.
9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates 1 Short Term Average(s) of: 8-HR
and Calculates PERIOD Averages

**This Run Includes: 2 Source(s); 1 Source Group(s); and 420 Receptor(s)

**The Model Assumes A Pollutant Type of: OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
Model Outputs Tables of PERIOD Averages by Receptor
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours

b for Both Calm and Missing Hours

```
**Misc. Inputs:  Anem. Hgt. (m) =     6.10 ;    Decay Coef. =    0.000      ;    Rot. Angle =     0.0
                 Emission Units = (GRAMS/SEC)                               ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = (MICROGRAMS/CUBIC-METER)

**Approximate Storage Requirements of Model =     1.2 MB of RAM.

**Input Runstream File:          vinyl.i88
**Output Print File:             vinyl.o88
```

400256

**MODELOPTs:
CONC   URBAN   FLAT   DFAULT   NOCMPL

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BUILDING EXISTS	EMISSION RATE SCALAR VARY BY
ORIGIN	0	0.00000E+00	0.0	0.0	0.0	10.00	300.00	10.00	3.00	NO	

400257

**MODELOPTs:
CONC URBAN FLAT DFAULT NOCMPL

*** AREAPOLY SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS /METER**2)	LOCATION OF AREA X (METERS)	LOCATION OF AREA Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	NUMBER OF VERTS.	INIT. SZ (METERS)	EMISSION RATE SCALAR VARY BY
SRC1	0	0.17521E-01	56.0	0.0	0.0	0.00	5	0.00	

400258

*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID	SOURCE IDs
ALL	ORIGIN , SRC1 ,

400259

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

*** ORIGIN FOR POLAR NETWORK ***
X-ORIG = 0.00 ; Y-ORIG = 0.00 (METERS)

*** DISTANCE RANGES OF NETWORK ***
(METERS)

150.0,	200.0,	300.0,	400.0,	500.0,	600.0,	700.0,	800.0,	900.0,	1000.0,

*** DIRECTION RADIALS OF NETWORK ***
(DEGREES)

10.0,	20.0,	30.0,	40.0,	50.0,	60.0,	70.0,	80.0,	90.0,	100.0,
110.0,	120.0,	130.0,	140.0,	150.0,	160.0,	170.0,	180.0,	190.0,	200.0,
210.0,	220.0,	230.0,	240.0,	250.0,	260.0,	270.0,	280.0,	290.0,	300.0,
310.0,	320.0,	330.0,	340.0,	350.0,	360.0,				

400260

**MODELOPTs:
CONC URBAN FLAT DFAULT NOCMPL

*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZFLAG)
(METERS)

```
(    -51.0,      96.6,      0.0,      0.0);       (    -30.1,      83.0,      0.0,      0.0);
(     -9.0,      69.5,      0.0,      0.0);       (     13.1,      57.8,      0.0,      0.0);
(     35.5,      46.8,      0.0,      0.0);       (     53.8,      30.4,      0.0,      0.0);
(     66.9,       9.1,      0.0,      0.0);       (     84.3,      -8.7,      0.0,      0.0);
(     75.1,     -28.3,      0.0,      0.0);       (     59.7,     -48.0,      0.0,      0.0);
(     44.2,     -67.7,      0.0,      0.0);       (     28.8,     -87.4,      0.0,      0.0);
(     13.4,    -107.0,      0.0,      0.0);       (     -2.0,    -126.7,      0.0,      0.0);
(    -19.6,    -111.2,      0.0,      0.0);       (    -37.3,     -93.6,      0.0,      0.0);
(    -54.9,     -75.9,      0.0,      0.0);       (    -60.2,     -58.0,      0.0,      0.0);
(    -78.5,     -40.9,      0.0,      0.0);       (    -96.1,     -39.0,      0.0,      0.0);
(   -113.9,     -21.5,      0.0,      0.0);       (   -126.5,      -2.0,      0.0,      0.0);
(   -111.9,      18.0,      0.0,      0.0);       (    -96.6,      37.8,      0.0,      0.0);
(    -81.3,      57.6,      0.0,      0.0);       (    -65.9,      77.3,      0.0,      0.0);
```

400261

*** DISCRETE POLAR RECEPTORS ***
ORIGIN: (DIST, DIR, ZELEV, ZFLAG)
SRCID: (METERS,DEG,METERS,METERS)

```
ORIGIN  : (   75.0,   10.0,   0.0,   0.0);    ORIGIN  : (  100.0,   10.0,   0.0,   0.0);
ORIGIN  : (   75.0,   20.0,   0.0,   0.0);    ORIGIN  : (  100.0,   20.0,   0.0,   0.0);
ORIGIN  : (   75.0,   30.0,   0.0,   0.0);    ORIGIN  : (  100.0,   30.0,   0.0,   0.0);
ORIGIN  : (   75.0,   40.0,   0.0,   0.0);    ORIGIN  : (  100.0,   40.0,   0.0,   0.0);
ORIGIN  : (   75.0,   50.0,   0.0,   0.0);    ORIGIN  : (  100.0,   50.0,   0.0,   0.0);
ORIGIN  : (   75.0,   60.0,   0.0,   0.0);    ORIGIN  : (  100.0,   60.0,   0.0,   0.0);
ORIGIN  : (   75.0,   70.0,   0.0,   0.0);    ORIGIN  : (  100.0,   70.0,   0.0,   0.0);
ORIGIN  : (   75.0,   80.0,   0.0,   0.0);    ORIGIN  : (  100.0,   80.0,   0.0,   0.0);
ORIGIN  : (  100.0,   90.0,   0.0,   0.0);    ORIGIN  : (  100.0,  100.0,   0.0,   0.0);
ORIGIN  : (  100.0,  110.0,   0.0,   0.0);    ORIGIN  : (  100.0,  120.0,   0.0,   0.0);
ORIGIN  : (  100.0,  130.0,   0.0,   0.0);    ORIGIN  : (  100.0,  140.0,   0.0,   0.0);
ORIGIN  : (  100.0,  150.0,   0.0,   0.0);    ORIGIN  : (  100.0,  160.0,   0.0,   0.0);
ORIGIN  : (  100.0,  210.0,   0.0,   0.0);    ORIGIN  : (  100.0,  220.0,   0.0,   0.0);
ORIGIN  : (  100.0,  230.0,   0.0,   0.0);    ORIGIN  : (  100.0,  240.0,   0.0,   0.0);
ORIGIN  : (  100.0,  310.0,   0.0,   0.0);    ORIGIN  : (  100.0,  340.0,   0.0,   0.0);
ORIGIN  : (   75.0,  350.0,   0.0,   0.0);    ORIGIN  : (  100.0,  350.0,   0.0,   0.0);
ORIGIN  : (   75.0,  360.0,   0.0,   0.0);    ORIGIN  : (  100.0,  360.0,   0.0,   0.0);
```


400262

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54,   3.09,   5.14,   8.23,   10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
B	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
C	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00
D	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00
E	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00
F	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01

F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

400264

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: EWKACY88.MET
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.: 14734   UPPER AIR STATION NO.: 93755
NAME: NEWARK   NAME: ATLANTIC_CITY
YEAR: 1988   YEAR: 1988

YR MN DY HR	FLOW VECTOR	SPEED (M/S)	TEMP (K)	STAB CLASS	MIXING HEIGHT (M) RURAL	URBAN	USTAR (M/S)	M-O LENGTH (M)	Z-0 (M)	IPCODE	PRATE (mm/HR)
88 01 01 01	21.0	4.12	275.9	4	387.6	387.6	0.0000	0.0	0.0000	0	0.00
88 01 01 02	28.0	4.12	275.9	4	357.8	357.8	0.0000	0.0	0.0000	0	0.00
88 01 01 03	44.0	3.09	277.0	4	328.0	328.0	0.0000	0.0	0.0000	0	0.00
88 01 01 04	43.0	3.09	276.5	4	298.1	298.1	0.0000	0.0	0.0000	0	0.00
88 01 01 05	43.0	3.09	275.9	4	268.3	268.3	0.0000	0.0	0.0000	0	0.00
88 01 01 06	32.0	3.09	275.9	4	238.5	238.5	0.0000	0.0	0.0000	0	0.00
88 01 01 07	35.0	2.06	275.9	5	208.7	103.0	0.0000	0.0	0.0000	0	0.00
88 01 01 08	43.0	3.60	276.5	4	0.0	94.1	0.0000	0.0	0.0000	0	0.00
88 01 01 09	47.0	4.12	276.5	4	0.0	78.4	0.0000	0.0	0.0000	0	0.00
88 01 01 10	41.0	4.12	277.6	4	0.0	62.7	0.0000	0.0	0.0000	0	0.00
88 01 01 11	34.0	5.14	278.2	4	0.0	47.1	0.0000	0.0	0.0000	0	0.00
88 01 01 12	36.0	4.63	278.7	4	0.0	31.4	0.0000	0.0	0.0000	0	0.00
88 01 01 13	43.0	4.12	278.7	4	0.0	15.7	0.0000	0.0	0.0000	0	0.00
88 01 01 14	49.0	5.14	278.7	4	0.0	0.0	0.0000	0.0	0.0000	0	0.00
88 01 01 15	72.0	5.66	279.3	4	0.0	0.0	0.0000	0.0	0.0000	0	0.00
88 01 01 16	74.0	6.17	279.8	4	0.0	0.0	0.0000	0.0	0.0000	0	0.00
88 01 01 17	71.0	4.63	278.7	4	9.0	9.0	0.0000	0.0	0.0000	0	0.00
88 01 01 18	67.0	6.69	278.7	4	29.7	29.7	0.0000	0.0	0.0000	0	0.00
88 01 01 19	74.0	7.72	277.0	4	50.5	50.5	0.0000	0.0	0.0000	0	0.00
88 01 01 20	67.0	5.66	277.0	4	71.3	71.3	0.0000	0.0	0.0000	0	0.00
88 01 01 21	90.0	6.69	275.9	4	92.0	92.0	0.0000	0.0	0.0000	0	0.00
88 01 01 22	82.0	5.66	274.8	4	112.8	112.8	0.0000	0.0	0.0000	0	0.00
88 01 01 23	70.0	6.17	274.8	4	133.6	133.6	0.0000	0.0	0.0000	0	0.00
88 01 01 24	90.0	4.12	274.3	4	154.3	154.3	0.0000	0.0	0.0000	0	0.00

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

400265

CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE PERIOD (8784 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 150.00	200.00	300.00	400.00	500.00	600.00	700.00	800.00	900.00
10.00	28.80883	19.34463	10.06318	6.10644	4.12791	3.00263	2.30141	1.83158	1.49894
20.00	38.50860	23.48443	11.06022	6.51063	4.35652	3.15770	2.41817	1.92631	1.58070
30.00	46.84414	27.14387	13.03292	7.92856	5.44294	4.02496	3.13315	2.53045	2.10243
40.00	59.23163	35.90563	17.59908	10.51315	7.09120	5.18305	4.00298	3.22064	2.66952
50.00	86.41669	47.62769	19.68917	10.87628	7.06141	5.05256	3.85572	3.07710	2.53876
60.00	102.73826	46.14017	17.24133	9.33239	6.01487	4.28647	3.25940	2.59475	2.13454
70.00	93.67075	41.39231	15.61786	8.43515	5.40010	3.81780	2.88050	2.27567	1.85856
80.00	92.30859	39.64611	14.27030	7.47077	4.66686	3.23003	2.39094	1.85454	1.48985
90.00	92.49528	39.31387	14.05107	7.32815	4.56756	3.15827	2.33712	1.81337	1.45762
100.00	72.05669	31.06971	11.33099	5.97544	3.75105	2.60732	1.93777	1.50864	1.21659
110.00	74.15639	31.63324	11.18180	5.80107	3.60741	2.49114	1.84274	1.42931	1.14898
120.00	64.65543	30.48907	11.81692	6.36140	4.03379	2.82007	2.10320	1.64253	1.32702
130.00	50.24522	26.54227	10.83087	5.95509	3.83157	2.70914	2.03899	1.60466	1.30560
140.00	35.58929	20.08380	9.14732	5.30362	3.50313	2.51467	1.91234	1.51504	1.23873
150.00	29.81450	15.79663	7.16585	4.19470	2.79353	2.01742	1.53958	1.22355	1.00294
160.00	30.29996	15.17911	6.38110	3.59076	2.34733	1.67813	1.27185	1.00666	0.82123
170.00	35.64502	17.75497	6.89033	3.78941	2.44251	1.72650	1.29370	1.01403	0.82295
180.00	32.65584	21.01640	9.33663	5.06821	3.18495	2.20281	1.63100	1.26446	1.01433
190.00	22.18788	17.19428	10.26900	6.59990	4.58956	3.39698	2.63575	2.11790	1.74672
200.00	14.43843	10.94553	7.22335	5.23082	4.01706	3.21970	2.66861	2.26765	1.96554
210.00	10.03669	7.36997	4.49961	3.11594	2.34208	1.85562	1.53101	1.29260	1.11772
220.00	7.70202	5.28209	3.10369	2.09954	1.53896	1.19042	0.95660	0.79085	0.66968
230.00	7.25237	4.71223	2.51332	1.60689	1.14036	0.86440	0.68587	0.56286	0.47381
240.00	7.16796	4.69127	2.49891	1.58362	1.11188	0.83495	0.65723	0.53552	0.44796
250.00	6.92730	4.62448	2.51015	1.60165	1.12797	0.84806	0.66769	0.54406	0.45492
260.00	6.28598	4.21565	2.30885	1.48115	1.04582	0.78683	0.61914	0.50390	0.42076
270.00	5.79375	3.85914	2.09943	1.34321	0.94786	0.71358	0.56220	0.45832	0.38350
280.00	6.09577	4.08726	2.24482	1.44543	1.02473	0.77426	0.61210	0.50040	0.41974
290.00	7.80589	5.36876	3.03179	1.98022	1.41448	1.07324	0.85061	0.69679	0.58514
300.00	9.80804	6.70795	3.74395	2.42115	1.71405	1.29066	1.01570	0.82647	0.69039
310.00	11.63759	7.89342	4.34836	2.78384	1.95568	1.46286	1.14454	0.92675	0.77010
320.00	13.54636	9.16029	5.02111	3.18916	2.22190	1.64978	1.28167	1.03135	0.85251
330.00	15.74064	10.24382	5.24478	3.21403	2.20009	1.61904	1.25370	1.00779	0.83201
340.00	16.75881	10.59676	5.55877	3.48730	2.41471	1.78677	1.38279	1.10852	0.91519
350.00	18.63961	12.17264	6.37647	3.99285	2.77722	2.06905	1.61625	1.30675	1.08496
360.00	22.32835	14.67332	8.03365	5.15653	3.63080	2.72159	2.13818	1.73439	1.44361

400266

```
*** ISCST3 - VERSION 00101 ***     *** 1988 Carlstadt, Vinyl Chloride Impacts from Excavation Site          ***        04/17/01
                                   *** Newark/Atlantic City Meteorology, 1987 - 1991 (3/29/91)              ***        08:04:27
**MODELOPTs:                                                                                                           PAGE  11
CONC                            URBAN  FLAT          DFAULT                                                     NOCMPL

                                     *** THE PERIOD (  8784 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL       ***
                                         INCLUDING SOURCE(S):      ORIGIN   , SRC1     ,

                                          *** NETWORK ID: POL      ;  NETWORK TYPE: GRIDPOLR ***

                                               ** CONC OF OTHER     IN (MICROGRAMS/CUBIC-METER)                  **
```

DIRECTION (DEGREES)	DISTANCE (METERS) 1000.00
10.00	1.25655
20.00	1.32901
30.00	1.78466
40.00	2.26787
50.00	2.14677
60.00	1.80024
70.00	1.55840
80.00	1.22940
90.00	1.20381
100.00	1.00698
110.00	0.94885
120.00	1.10077
130.00	1.08931
140.00	1.03825
150.00	0.84146
160.00	0.68709
170.00	0.68171
180.00	0.83657
190.00	1.47025
200.00	1.73504
210.00	0.98141
220.00	0.57727
230.00	0.40708
240.00	0.38276
250.00	0.38846
260.00	0.35842
270.00	0.32763
280.00	0.35959
290.00	0.50132
300.00	0.58854
310.00	0.65359
320.00	0.72019
330.00	0.70371
340.00	0.77009
350.00	0.92157
360.00	1.23009

*** THE PERIOD (8784 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
-51.00	96.60	24.40767	-30.10	83.00	35.19539
-9.00	69.50	54.62408	13.10	57.80	90.75739
35.50	46.80	181.04848	53.80	30.40	614.60229
66.90	9.10	5073.34521	84.30	-8.70	1038.06543
75.10	-28.30	729.35016	59.70	-48.00	268.61758
44.20	-67.70	166.31490	28.80	-87.40	95.16369
13.40	-107.00	57.25779	-2.00	-126.70	37.26105
-19.60	-111.20	26.80749	-37.30	-93.60	18.76718
-54.90	-75.90	14.80990	-60.20	-58.00	16.16695
-78.50	-40.90	14.06981	-96.10	-39.00	11.26024
-113.90	-21.50	8.82701	-126.50	-2.00	7.30240
-111.90	18.00	8.65711	-96.60	37.80	12.42637
-81.30	57.60	17.41276	-65.90	77.30	21.55225

400268

*** THE PERIOD (8784 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE POLAR RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC	ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC
ORIGIN :	75.00	10.00	66.26178	ORIGIN :	100.00	10.00	48.03683
ORIGIN :	75.00	20.00	85.83097	ORIGIN :	100.00	20.00	63.86905
ORIGIN :	75.00	30.00	117.96786	ORIGIN :	100.00	30.00	91.82362
ORIGIN :	75.00	40.00	180.03662	ORIGIN :	100.00	40.00	126.48405
ORIGIN :	75.00	50.00	292.36520	ORIGIN :	100.00	50.00	176.68111
ORIGIN :	75.00	60.00	489.86053	ORIGIN :	100.00	60.00	293.66745
ORIGIN :	75.00	70.00	1025.17029	ORIGIN :	100.00	70.00	409.75858
ORIGIN :	75.00	80.00	2132.01758	ORIGIN :	100.00	80.00	422.09195
ORIGIN :	100.00	90.00	448.39758	ORIGIN :	100.00	100.00	353.39032
ORIGIN :	100.00	110.00	308.44501	ORIGIN :	100.00	120.00	200.07657
ORIGIN :	100.00	130.00	119.02061	ORIGIN :	100.00	140.00	91.98792
ORIGIN :	100.00	150.00	88.24911	ORIGIN :	100.00	160.00	86.95125
ORIGIN :	100.00	210.00	14.94119	ORIGIN :	100.00	220.00	13.22250
ORIGIN :	100.00	230.00	12.71680	ORIGIN :	100.00	240.00	12.32520
ORIGIN :	100.00	310.00	18.80380	ORIGIN :	100.00	340.00	30.35274
ORIGIN :	75.00	350.00	48.80775	ORIGIN :	100.00	350.00	33.31355
ORIGIN :	75.00	360.00	55.53254	ORIGIN :	100.00	360.00	38.51563

400269

*** ISCST3 - VERSION 00101 ***   *** 1988 Carlstadt, Vinyl Chloride Impacts from Excavation Site   ***   04/17/01
*** Newark/Atlantic City Meteorology, 1987 - 1991 (3/29/91)   ***   08:04:27
**MODELOPTs: PAGE 14
CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 150.00	200.00	300.00	400.00	500.00
10.0	713.53094 (88021508)	640.55945c(88112024)	526.75836c(88112024)	381.09341c(88112024)	283.97125c(88112024)
20.0	1221.05042 (88021508)	737.55707c(88112024)	344.02591c(88112024)	212.51161c(88112024)	156.55602c(88112024)
30.0	854.81085c(88112024)	616.79901 (88112608)	262.75290c(88112024)	188.57924c(88112024)	143.23264c(88112024)
40.0	1140.02478 (88112608)	638.69025c(88012808)	408.47424 (88020208)	352.32642 (88020208)	298.25546 (88020208)
50.0	1439.36536c(88012808)	881.54303 (88020216)	730.54041 (88020216)	581.82715 (88020216)	477.96790 (88020216)
60.0	1867.22571 (88020216)	1560.09827 (88020216)	1082.75793 (88020216)	812.08246 (88020216)	646.42676 (88020216)
70.0	2866.94727 (88020216)	1881.20020 (88020216)	1003.02716 (88020216)	657.09161 (88020216)	482.18753 (88020216)
80.0	1970.43726c(88011524)	810.16455c(88011524)	333.16391c(88112024)	216.81558c(88112024)	159.11606c(88112024)
90.0	2126.05444 (88120108)	962.49976 (88120108)	358.86273 (88120108)	191.24026 (88120108)	121.07185 (88120108)
100.0	1522.29993c(88012224)	790.90460c(88012224)	329.89920c(88012224)	183.74110c(88012224)	119.01856c(88012224)
110.0	1483.93860 (88092608)	718.38251c(88012308)	285.66464 (88112108)	206.30145 (88112108)	161.47716 (88112108)
120.0	1428.66223c(88072908)	883.04755c(88072908)	316.87839 (88051208)	162.35455 (88051208)	119.11252 (88112108)
130.0	1383.97095 (88111508)	603.47644 (88111508)	171.97409c(88072908)	127.79594c(88072908)	93.75408c(88072908)
140.0	864.67603 (88083108)	421.58807 (88063008)	261.67389 (88111508)	157.86282 (88111508)	98.68758 (88111508)
150.0	622.24481 (88112408)	384.35565 (88112408)	172.51440 (88083108)	89.35307 (88122208)	56.64664 (88063008)
160.0	783.21735 (88061108)	440.58789c(88101708)	157.89761 (88112408)	95.97153 (88112408)	61.03056 (88083108)
170.0	3064.66772c(88112024)	958.42401c(88112024)	198.98195c(88101708)	117.14028c(88101708)	72.15961c(88101708)
180.0	4560.75732c(88112024)	3049.22217c(88112024)	1183.30164c(88112024)	544.41095c(88112024)	294.28256c(88112024)
190.0	2656.41846c(88112024)	3060.78516c(88112024)	2379.96167c(88112024)	1695.62463c(88112024)	1248.20117c(88112024)
200.0	830.24164c(88031208)	1126.78442c(88112024)	1478.08899c(88112024)	1434.93738c(88112024)	1308.32397c(88112024)
210.0	565.03265c(88031208)	484.22119c(88031208)	283.55234c(88112024)	348.11923c(88112024)	366.44601c(88112024)
220.0	344.35641c(88112708)	247.32828 (88032616)	176.10567 (88032616)	128.57240 (88032616)	98.47489 (88032616)
230.0	267.37036 (88032908)	215.98885c(88112708)	134.27682 (88032616)	118.60678 (88032616)	104.39928 (88032616)
240.0	323.49927c(88031224)	194.32600c(88031224)	94.66439c(88011924)	60.35360c(88011924)	41.58434c(88011924)
250.0	363.95816c(88070708)	245.79417c(88070708)	129.15697c(88070708)	78.72015c(88070708)	55.69779c(88031224)
260.0	283.59869c(88040108)	196.91542c(88040108)	111.53146c(88040108)	72.63900c(88040108)	51.66155c(88040108)
270.0	282.34381c(88031308)	190.56827c(88031308)	105.51478c(88031308)	68.13960c(88031308)	48.28342c(88031308)
280.0	236.74896 (88032508)	164.11256 (88032508)	96.86899 (88032508)	66.54781 (88032508)	49.77806 (88032508)
290.0	292.10486 (88082724)	194.34344c(88053008)	120.92633c(88053008)	82.82209c(88053008)	60.86266c(88053008)
300.0	480.31570c(88053008)	334.32147 (88033008)	192.42017 (88033008)	124.29092 (88033008)	87.30013 (88033008)
310.0	485.44467 (88033008)	274.72131 (88033008)	112.70641c(88050508)	75.54568 (88080124)	60.46450 (88080124)
320.0	444.08939 (88080124)	372.79739 (88080124)	219.46819 (88080124)	134.09206 (88080124)	88.53658 (88080124)
330.0	615.75403 (88080124)	318.23813c(88090408)	149.48692c(88030908)	80.61388c(88030908)	55.68145c(88011724)
340.0	431.74258c(88090408)	250.82239c(88011724)	131.03299c(88111524)	95.13404 (88032616)	76.41734 (88032616)
350.0	420.91385c(88111524)	250.27905c(88111524)	155.54100c(88080208)	95.14156c(88080208)	68.20444c(88112024)
360.0	518.45770c(88080208)	310.64349c(88080208)	287.20700c(88112024)	292.98633c(88112024)	271.85556c(88112024)

400270

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 600.00	700.00	800.00	900.00	1000.00
10.0	221.61113c(88112024)	179.76993c(88112024)	149.76810c(88112024)	125.46782c(88112024)	108.09005c(88112024)
20.0	125.43504c(88112024)	106.45947c(88112024)	93.05148c(88112024)	82.63837c(88112024)	75.34769c(88112024)
30.0	120.49761 (88020208)	112.62417 (88020208)	104.70438 (88020208)	97.43428 (88020208)	91.12508 (88020208)
40.0	256.00595 (88020208)	226.07433 (88020216)	203.54239 (88020216)	185.02266 (88020216)	169.64149 (88020216)
50.0	403.90317 (88020216)	349.06390 (88020216)	307.97382 (88020216)	275.50198 (88020216)	249.05222 (88020216)
60.0	536.46173 (88020216)	458.53033 (88020216)	400.43481 (88020216)	355.64362 (88020216)	321.55774 (88020216)
70.0	378.09460 (88020216)	310.00946 (88020216)	262.67719 (88020216)	226.74078 (88020216)	200.75568 (88020216)
80.0	124.93434c(88112024)	102.50159c(88112024)	86.31461c(88112024)	74.58278c(88112024)	65.43620c(88112024)
90.0	84.76545 (88120108)	63.34322 (88120108)	49.56955 (88120108)	40.15229 (88120108)	33.37359c(88112024)
100.0	92.83466 (88112108)	77.90174 (88112108)	67.96076c(88112024)	60.86595c(88112024)	55.22968c(88112024)
110.0	132.89575 (88112108)	112.91386 (88112108)	98.52158 (88112108)	87.28124 (88112108)	78.56783 (88112108)
120.0	99.15614 (88112108)	85.42290 (88112108)	74.54668 (88112108)	66.17833 (88112108)	59.56547 (88112108)
130.0	75.24798 (88112116)	64.31550 (88112116)	56.12235 (88112116)	50.02596 (88112116)	44.91959 (88112116)
140.0	66.13613 (88111508)	54.12394 (88112116)	47.49300 (88112116)	42.16232 (88112116)	38.23327 (88112116)
150.0	45.04440 (88063008)	36.48569 (88063008)	30.10874 (88063008)	27.61485 (88112116)	25.37642 (88112116)
160.0	45.81764 (88083108)	35.45850 (88083108)	28.21634 (88083108)	23.00056 (88083108)	19.29823 (88083108)
170.0	47.56464c(88101708)	33.07897c(88101708)	24.20019c(88101708)	18.53036 (88111824)	16.55479 (88020416)
180.0	175.99744c(88112024)	117.13906c(88112024)	81.55724c(88112024)	58.19949c(88112024)	43.51854c(88112024)
190.0	960.90417c(88112024)	768.10297c(88112024)	631.10468c(88112024)	526.87640c(88112024)	446.08246c(88112024)
200.0	1176.27185c(88112024)	1062.73462c(88112024)	964.17297c(88112024)	881.80377c(88112024)	816.21503c(88112024)
210.0	360.11777c(88112024)	350.80035c(88112024)	330.24954c(88112024)	314.36639c(88112024)	297.17377c(88112024)
220.0	78.97314 (88032616)	65.17967 (88032616)	54.78221 (88032616)	47.43437 (88032616)	43.52843 (88030408)
230.0	92.59708 (88032616)	82.95472 (88032616)	75.42102 (88032616)	68.96299 (88032616)	63.79485 (88032616)
240.0	30.90105 (88032908)	28.17825 (88032616)	26.02280 (88032616)	23.88368 (88032616)	21.96268 (88032616)
250.0	42.26377c(88031224)	33.42273c(88031224)	27.30131c(88031224)	22.83565c(88031224)	19.51143c(88031224)
260.0	38.97393c(88040108)	30.67823c(88040108)	24.98823c(88040108)	20.86383c(88082508)	17.97069c(88082508)
270.0	39.30678 (88112016)	34.44423 (88112016)	30.74056 (88112016)	27.84286 (88112016)	25.49492 (88112016)
280.0	39.27770 (88032508)	32.24471 (88032508)	27.22287 (88032508)	24.39507 (88112016)	22.18078 (88112016)
290.0	46.98959c(88053008)	40.71009 (88040624)	36.39241 (88040624)	32.95967 (88040624)	30.13151 (88040624)
300.0	65.12381 (88033008)	50.79940 (88033008)	40.99075 (88033008)	33.98414 (88033008)	28.70686 (88033008)
310.0	49.18425 (88080124)	40.75362 (88080124)	34.46688 (88080124)	29.53711 (88080124)	25.74369 (88080124)
320.0	62.35969 (88080124)	46.22579 (88080124)	35.63977 (88080124)	29.07719c(88090408)	26.05371 (88042324)
330.0	48.26521 (88032616)	44.45383 (88032616)	41.36543 (88032616)	38.30256 (88032616)	35.34510 (88032616)
340.0	63.44909 (88032616)	53.33839 (88032616)	45.60551 (88032616)	40.61399 (88032616)	35.35568 (88032616)
350.0	69.44102c(88112024)	67.99409c(88112024)	63.95104c(88112024)	61.96431c(88112024)	60.89555c(88112024)
360.0	245.76436c(88112024)	223.82825c(88112024)	203.24077c(88112024)	184.90724c(88112024)	171.95564c(88112024)

400271

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
-51.00	96.60	1007.59949	(88080124)	-30.10	83.00	1391.50403	(88080124)
-9.00	69.50	1828.42139	(88080124)	13.10	57.80	2249.41333c	(88090408)
35.50	46.80	3640.39648c	(88111524)	53.80	30.40	17083.61520	(88021508)
66.90	9.10	50571.49610c	(88012808)	84.30	-8.70	19089.16600c	(88012224)
75.10	-28.30	15869.47750	(88111508)	59.70	-48.00	7216.05762c	(88101708)
44.20	-67.70	7365.54395c	(88112024)	28.80	-87.40	7728.13428c	(88112024)
13.40	-107.00	6049.73389c	(88112024)	-2.00	-126.70	4528.42822c	(88112024)
-19.60	-111.20	1466.22644c	(88112024)	-37.30	-93.60	1017.86340c	(88031208)
-54.90	-75.90	684.06885c	(88112708)	-60.20	-58.00	543.32648c	(88011924)
-78.50	-40.90	691.88531c	(88070708)	-96.10	-39.00	570.77856c	(88070708)
-113.90	-21.50	387.90292c	(88040108)	-126.50	-2.00	347.60236c	(88031308)
-111.90	18.00	323.27924	(88032508)	-96.60	37.80	470.77820	(88082724)
-81.30	57.60	836.26373c	(88053008)	-65.90	77.30	667.29755	(88033008)

400272

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE POLAR RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

ORIGIN SRCID		DIST (M)	DIR (DEG)	CONC	(YYMMDDHH)	ORIGIN SRCID		DIST (M)	DIR (DEG)	CONC	(YYMMDDHH)
ORIGIN	:	75.00	10.00	1415.04529c	(88011724)	ORIGIN	:	100.00	10.00	1046.41516c	(88080208)
ORIGIN	:	75.00	20.00	1677.74536	(88050824)	ORIGIN	:	100.00	20.00	1406.58777c	(88013124)
ORIGIN	:	75.00	30.00	2587.79492c	(88080208)	ORIGIN	:	100.00	30.00	2942.94849	(88021508)
ORIGIN	:	75.00	40.00	4933.69824	(88021508)	ORIGIN	:	100.00	40.00	2621.71021c	(88011708)
ORIGIN	:	75.00	50.00	8661.30078	(88021508)	ORIGIN	:	100.00	50.00	3716.87207	(88112608)
ORIGIN	:	75.00	60.00	8681.72949	(88070408)	ORIGIN	:	100.00	60.00	4886.52588c	(88012808)
ORIGIN	:	75.00	70.00	14603.30860	(88013108)	ORIGIN	:	100.00	70.00	4819.80029c	(88112308)
ORIGIN	:	75.00	80.00	20478.67380c	(88012808)	ORIGIN	:	100.00	80.00	5395.65674	(88020216)
ORIGIN	:	100.00	90.00	7435.68408	(88120108)	ORIGIN	:	100.00	100.00	6348.91357c	(88021708)
ORIGIN	:	100.00	110.00	7641.50732c	(88072908)	ORIGIN	:	100.00	120.00	5025.21045	(88111508)
ORIGIN	:	100.00	130.00	2859.47266	(88083108)	ORIGIN	:	100.00	140.00	2492.95239c	(88101708)
ORIGIN	:	100.00	150.00	2188.46655c	(88112024)	ORIGIN	:	100.00	160.00	6103.93457c	(88112024)
ORIGIN	:	100.00	210.00	559.36774	(88032508)	ORIGIN	:	100.00	220.00	573.58777c	(88112708)
ORIGIN	:	100.00	230.00	442.92896c	(88031224)	ORIGIN	:	100.00	240.00	562.96637c	(88031224)
ORIGIN	:	100.00	310.00	902.86560	(88033008)	ORIGIN	:	100.00	340.00	1075.89038	(88080124)
ORIGIN	:	75.00	350.00	1630.74487	(88080124)	ORIGIN	:	100.00	350.00	819.88593c	(88090408)
ORIGIN	:	75.00	360.00	1380.70935c	(88090408)	ORIGIN	:	100.00	360.00	842.23761c	(88111524)

400273

*** THE SUMMARY OF MAXIMUM PERIOD (8784 HRS) RESULTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

GROUP ID		AVERAGE CONC	RECEPTOR (XR,	YR,	ZELEV,	ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	1ST HIGHEST VALUE IS	5073.34521 AT (	66.90,	9.10,	0.00,	0.00)	DC	NA
	2ND HIGHEST VALUE IS	2132.01758 AT (	73.86,	13.02,	0.00,	0.00)	DP	NA
	3RD HIGHEST VALUE IS	1038.06543 AT (	84.30,	-8.70,	0.00,	0.00)	DC	NA
	4TH HIGHEST VALUE IS	1025.17029 AT (	70.48,	25.65,	0.00,	0.00)	DP	NA
	5TH HIGHEST VALUE IS	729.35016 AT (	75.10,	-28.30,	0.00,	0.00)	DC	NA
	6TH HIGHEST VALUE IS	614.60229 AT (	53.80,	30.40,	0.00,	0.00)	DC	NA
	7TH HIGHEST VALUE IS	489.86053 AT (	64.95,	37.50,	0.00,	0.00)	DP	NA
	8TH HIGHEST VALUE IS	448.39758 AT (	100.00,	0.00,	0.00,	0.00)	DP	NA
	9TH HIGHEST VALUE IS	422.09195 AT (	98.48,	17.36,	0.00,	0.00)	DP	NA
	10TH HIGHEST VALUE IS	409.75858 AT (	93.97,	34.20,	0.00,	0.00)	DP	NA

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

400274

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	50571.49610c	ON 88012808:	AT (66.90, 9.10, 0.00, 0.00)	DC	NA

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

400275

```
*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of         610 Informational Message(s)

A Total of         176 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
SO W320    17 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

400276

1989 METEOROLOGICAL DATA

```
CO STARTING
CO TITLEONE 1989 Carlstadt, Vinyl Chloride Impacts from Excavation Site
CO TITLETWO Newark/Atlantic City Meteorology, 1987 - 1991 (3/29/91)
CO MODELOPT DFAULT CONC   URBAN  NOCMPL
CO AVERTIME PERIOD 8
CO POLLUTID OTHER
CO DCAYCOEF    .000000
CO RUNORNOT RUN
CO FINISHED

SO STARTING
** Source Location Cards:
**         SRCID SRCTYP      XS     YS      ZS
**                          (m)    (m)     (m)
** SOURCE ORIGIN ONLY USED FOR RECEPTOR PLACEMENT
SO LOCATION ORIGIN POINT      0.0    0.0      0.0
SO SRCPARAM ORIGIN 0.0  10  300 10.0 3.0

** SOURCE ORIGIN FOR AREAPOLY
**         SRCID SRCTYP      XS     YS      ZS
**                          (m)    (m)     (m)
SO LOCATION SRC1  AREAPOLY   56.05  0.0      0.0

** Source Parameter Cards:
** AREAPOLY SOURCE
**                 Q          RH     NoVert.   Sz(optional)
**      SRCID     (g/s/m2)   (m)     (#)       (m)
SO SRCPARAM SRC1  0.017521    0.00    5
SO AREAVERT SRC1   56.05  0.00   54.12  6.69   61.11  4.31
SO AREAVERT SRC1   65.72 -8.92   59.62 -14.12
SO EMISUNIT    .100000E+07 (GRAMS/SEC)          (MICROGRAMS/CUBIC-METER)
SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE GRIDPOLR POL STA
RE GRIDPOLR POL ORIG  0.0   0.0
RE GRIDPOLR POL DIST  150 200 300 400 500 600 700 800 900 1000
RE GRIDPOLR POL GDIR  36  10.00  10.00
RE GRIDPOLR POL END
**  FENCELINE RECEPTORS AT  25-M INTERVALS
RE DISCCART      -51.0      96.6
RE DISCCART      -30.1      83.0
RE DISCCART       -9.0      69.5
RE DISCCART       13.1      57.8
RE DISCCART       35.5      46.8
RE DISCCART       53.8      30.4
RE DISCCART       66.9       9.1
RE DISCCART       84.3      -8.7
RE DISCCART       75.1     -28.3
RE DISCCART       59.7     -48.0
```


400278

```
RE DISCCART         44.2      -67.7
RE DISCCART         28.8      -87.4
RE DISCCART         13.4     -107.0
RE DISCCART         -2.0     -126.7
RE DISCCART        -19.6     -111.2
RE DISCCART        -37.3      -93.6
RE DISCCART        -54.9      -75.9
RE DISCCART        -60.2      -58.0
RE DISCCART        -78.5      -40.9
RE DISCCART        -96.1      -39.0
RE DISCCART       -113.9      -21.5
RE DISCCART       -126.5       -2.0
RE DISCCART       -111.9       18.0
RE DISCCART        -96.6       37.8
RE DISCCART        -81.3       57.6
RE DISCCART        -65.9       77.3
RE DISCPOLR ORIGIN        75.          10
RE DISCPOLR ORIGIN       100.         10
RE DISCPOLR ORIGIN        75.          20
RE DISCPOLR ORIGIN       100.          20
RE DISCPOLR ORIGIN        75.          30
RE DISCPOLR ORIGIN       100.          30
RE DISCPOLR ORIGIN        75.          40
RE DISCPOLR ORIGIN       100.          40
RE DISCPOLR ORIGIN        75.          50
RE DISCPOLR ORIGIN       100.          50
RE DISCPOLR ORIGIN        75.          60
RE DISCPOLR ORIGIN       100.          60
RE DISCPOLR ORIGIN        75.          70
RE DISCPOLR ORIGIN       100.          70
RE DISCPOLR ORIGIN        75.          80
RE DISCPOLR ORIGIN       100.          80
RE DISCPOLR ORIGIN       100.          90
RE DISCPOLR ORIGIN       100.         100
RE DISCPOLR ORIGIN       100.         110
RE DISCPOLR ORIGIN       100.         120
RE DISCPOLR ORIGIN       100.         130
RE DISCPOLR ORIGIN       100.         140
RE DISCPOLR ORIGIN       100.         150
RE DISCPOLR ORIGIN       100.         160
RE DISCPOLR ORIGIN       100.         210
RE DISCPOLR ORIGIN       100.         220
RE DISCPOLR ORIGIN       100.         230
RE DISCPOLR ORIGIN       100.         240
RE DISCPOLR ORIGIN       100.         310
RE DISCPOLR ORIGIN       100.         340
RE DISCPOLR ORIGIN        75.         350
RE DISCPOLR ORIGIN       100.         350
RE DISCPOLR ORIGIN        75.         360
RE DISCPOLR ORIGIN       100.         360
RE FINISHED
```

```
ME STARTING
ME INPUTFIL EWKACY89.MET
ME ANEMHGHT  20 FEET
ME SURFDATA  14734      1989       NEWARK
ME UAIRDATA  93755      1989       ATLANTIC_CITY
ME WINDCATS    1.54     3.09    5.14    8.23   10.80
ME FINISHED

OU STARTING
OU RECTABLE ALLAVE FIRST
OU PLOTFILE 8 ALL FIRST 08.P89
OU FINISHED

 *** Message Summary For ISC3 Model Setup ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of           0 Informational Message(s)


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
SO W320    17 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

***********************************
*** SETUP Finishes Successfully ***
***********************************
```

400280

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** MODEL SETUP OPTIONS SUMMARY ***

- -

**Simple Terrain Model is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

-- SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION. DDPLETE = F
**Model Uses NO WET DEPLETION. WDPLETE = F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:

1. Final Plume Rise.
2. Stack-tip Downwash.
3. Buoyancy-induced Dispersion.
4. Use Calms Processing Routine.
5. Not Use Missing Data Processing Routine.
6. Default Wind Profile Exponents.
7. Default Vertical Potential Temperature Gradients.
8. "Upper Bound" Values for Supersquat Buildings.
9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates 1 Short Term Average(s) of: 8-HR
and Calculates PERIOD Averages

**This Run Includes: 2 Source(s);   1 Source Group(s); and   420 Receptor(s)

**The Model Assumes A Pollutant Type of: OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
Model Outputs Tables of PERIOD Averages by Receptor
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours

400281

b for Both Calm and Missing Hours

```
**Misc. Inputs:  Anem. Hgt. (m) =     6.10 ;    Decay Coef. =    0.000      ;    Rot. Angle =     0.0
                 Emission Units = (GRAMS/SEC)                                ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = (MICROGRAMS/CUBIC-METER)

**Approximate Storage Requirements of Model =     1.2 MB of RAM.

**Input Runstream File:          vinyl.i89
**Output Print File:             vinyl.o89
```

400282

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BUILDING EXISTS	EMISSION RATE SCALAR VARY BY
ORIGIN	0	0.00000E+00	0.0	0.0	0.0	10.00	300.00	10.00	3.00	NO	

400283

*** AREAPOLY SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS /METER**2)	LOCATION OF AREA X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	NUMBER OF VERTS.	INIT. SZ (METERS)	EMISSION RATE SCALAR VARY BY
SRC1	0	0.17521E-01	56.0	0.0	0.0	0.00	5	0.00	

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*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID	SOURCE IDs
ALL	ORIGIN , SRC1 ,

400285

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

*** ORIGIN FOR POLAR NETWORK ***
X-ORIG = 0.00 ; Y-ORIG = 0.00 (METERS)

*** DISTANCE RANGES OF NETWORK ***
(METERS)

150.0,	200.0,	300.0,	400.0,	500.0,	600.0,	700.0,	800.0,	900.0,	1000.0,

*** DIRECTION RADIALS OF NETWORK ***
(DEGREES)

10.0,	20.0,	30.0,	40.0,	50.0,	60.0,	70.0,	80.0,	90.0,	100.0,
110.0,	120.0,	130.0,	140.0,	150.0,	160.0,	170.0,	180.0,	190.0,	200.0,
210.0,	220.0,	230.0,	240.0,	250.0,	260.0,	270.0,	280.0,	290.0,	300.0,
310.0,	320.0,	330.0,	340.0,	350.0,	360.0,				

400286

**MODELOPTs:
CONC URBAN FLAT DFAULT NOCMPL

*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZFLAG)
(METERS)

(-51.0,	96.6,	0.0,	0.0);	(-30.1,	83.0,	0.0,	0.0);
(-9.0,	69.5,	0.0,	0.0);	(13.1,	57.8,	0.0,	0.0);
(35.5,	46.8,	0.0,	0.0);	(53.8,	30.4,	0.0,	0.0);
(66.9,	9.1,	0.0,	0.0);	(84.3,	-8.7,	0.0,	0.0);
(75.1,	-28.3,	0.0,	0.0);	(59.7,	-48.0,	0.0,	0.0);
(44.2,	-67.7,	0.0,	0.0);	(28.8,	-87.4,	0.0,	0.0);
(13.4,	-107.0,	0.0,	0.0);	(-2.0,	-126.7,	0.0,	0.0);
(-19.6,	-111.2,	0.0,	0.0);	(-37.3,	-93.6,	0.0,	0.0);
(-54.9,	-75.9,	0.0,	0.0);	(-60.2,	-58.0,	0.0,	0.0);
(-78.5,	-40.9,	0.0,	0.0);	(-96.1,	-39.0,	0.0,	0.0);
(-113.9,	-21.5,	0.0,	0.0);	(-126.5,	-2.0,	0.0,	0.0);
(-111.9,	18.0,	0.0,	0.0);	(-96.6,	37.8,	0.0,	0.0);
(-81.3,	57.6,	0.0,	0.0);	(-65.9,	77.3,	0.0,	0.0);

400287

*** DISCRETE POLAR RECEPTORS ***
ORIGIN: (DIST, DIR, ZELEV, ZFLAG)
SRCID: (METERS,DEG,METERS,METERS)

```
ORIGIN  : (   75.0,   10.0,   0.0,   0.0);     ORIGIN  : (  100.0,   10.0,   0.0,   0.0);
ORIGIN  : (   75.0,   20.0,   0.0,   0.0);     ORIGIN  : (  100.0,   20.0,   0.0,   0.0);
ORIGIN  : (   75.0,   30.0,   0.0,   0.0);     ORIGIN  : (  100.0,   30.0,   0.0,   0.0);
ORIGIN  : (   75.0,   40.0,   0.0,   0.0);     ORIGIN  : (  100.0,   40.0,   0.0,   0.0);
ORIGIN  : (   75.0,   50.0,   0.0,   0.0);     ORIGIN  : (  100.0,   50.0,   0.0,   0.0);
ORIGIN  : (   75.0,   60.0,   0.0,   0.0);     ORIGIN  : (  100.0,   60.0,   0.0,   0.0);
ORIGIN  : (   75.0,   70.0,   0.0,   0.0);     ORIGIN  : (  100.0,   70.0,   0.0,   0.0);
ORIGIN  : (   75.0,   80.0,   0.0,   0.0);     ORIGIN  : (  100.0,   80.0,   0.0,   0.0);
ORIGIN  : (  100.0,   90.0,   0.0,   0.0);     ORIGIN  : (  100.0,  100.0,   0.0,   0.0);
ORIGIN  : (  100.0,  110.0,   0.0,   0.0);     ORIGIN  : (  100.0,  120.0,   0.0,   0.0);
ORIGIN  : (  100.0,  130.0,   0.0,   0.0);     ORIGIN  : (  100.0,  140.0,   0.0,   0.0);
ORIGIN  : (  100.0,  150.0,   0.0,   0.0);     ORIGIN  : (  100.0,  160.0,   0.0,   0.0);
ORIGIN  : (  100.0,  210.0,   0.0,   0.0);     ORIGIN  : (  100.0,  220.0,   0.0,   0.0);
ORIGIN  : (  100.0,  230.0,   0.0,   0.0);     ORIGIN  : (  100.0,  240.0,   0.0,   0.0);
ORIGIN  : (  100.0,  310.0,   0.0,   0.0);     ORIGIN  : (  100.0,  340.0,   0.0,   0.0);
ORIGIN  : (   75.0,  350.0,   0.0,   0.0);     ORIGIN  : (  100.0,  350.0,   0.0,   0.0);
ORIGIN  : (   75.0,  360.0,   0.0,   0.0);     ORIGIN  : (  100.0,  360.0,   0.0,   0.0);
```

400288

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
B	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
C	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00
D	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00
E	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00
F	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01

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F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

400290

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: EWKACY89.MET
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.: 14734   UPPER AIR STATION NO.: 93755
NAME: NEWARK   NAME: ATLANTIC_CITY
YEAR: 1989   YEAR: 1989

YR	MN	DY	HR	FLOW VECTOR	SPEED (M/S)	TEMP (K)	STAB CLASS	MIXING HEIGHT (M) RURAL	MIXING HEIGHT (M) URBAN	USTAR (M/S)	M-O LENGTH (M)	Z-0 (M)	IPCODE	PRATE (mm/HR)
89	01	01	01	221.0	2.06	273.7	6	192.7	399.0	0.0000	0.0	0.0000	0	0.00
89	01	01	02	158.0	1.54	273.7	6	180.4	399.0	0.0000	0.0	0.0000	0	0.00
89	01	01	03	204.0	3.60	274.3	5	168.0	399.0	0.0000	0.0	0.0000	0	0.00
89	01	01	04	193.0	3.60	273.1	4	155.6	155.6	0.0000	0.0	0.0000	0	0.00
89	01	01	05	213.0	4.63	273.1	4	143.3	143.3	0.0000	0.0	0.0000	0	0.00
89	01	01	06	212.0	3.60	272.6	5	130.9	399.0	0.0000	0.0	0.0000	0	0.00
89	01	01	07	215.0	3.09	272.0	5	118.6	399.0	0.0000	0.0	0.0000	0	0.00
89	01	01	08	203.0	4.12	272.0	4	2.8	367.4	0.0000	0.0	0.0000	0	0.00
89	01	01	09	237.0	4.63	273.7	4	7.6	311.5	0.0000	0.0	0.0000	0	0.00
89	01	01	10	251.0	4.12	274.8	4	12.5	255.6	0.0000	0.0	0.0000	0	0.00
89	01	01	11	254.0	4.12	275.4	4	17.4	199.7	0.0000	0.0	0.0000	0	0.00
89	01	01	12	216.0	3.60	275.4	4	22.3	143.8	0.0000	0.0	0.0000	0	0.00
89	01	01	13	213.0	4.63	275.4	4	27.1	87.9	0.0000	0.0	0.0000	0	0.00
89	01	01	14	209.0	5.14	275.4	4	32.0	32.0	0.0000	0.0	0.0000	0	0.00
89	01	01	15	212.0	5.66	274.8	4	32.0	32.0	0.0000	0.0	0.0000	0	0.00
89	01	01	16	214.0	6.17	274.8	4	32.0	32.0	0.0000	0.0	0.0000	0	0.00
89	01	01	17	211.0	4.63	274.8	4	35.3	35.3	0.0000	0.0	0.0000	0	0.00
89	01	01	18	207.0	3.60	275.4	4	43.0	43.0	0.0000	0.0	0.0000	0	0.00
89	01	01	19	214.0	4.12	275.4	4	50.6	50.6	0.0000	0.0	0.0000	0	0.00
89	01	01	20	207.0	3.09	275.9	4	58.3	58.3	0.0000	0.0	0.0000	0	0.00
89	01	01	21	220.0	5.14	275.4	4	65.9	65.9	0.0000	0.0	0.0000	0	0.00
89	01	01	22	202.0	5.14	274.8	4	73.6	73.6	0.0000	0.0	0.0000	0	0.00
89	01	01	23	190.0	5.14	274.8	4	81.2	81.2	0.0000	0.0	0.0000	0	0.00
89	01	01	24	200.0	3.60	274.8	4	88.9	88.9	0.0000	0.0	0.0000	0	0.00

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

400291

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 150.00	200.00	300.00	400.00	500.00	600.00	700.00	800.00	900.00
10.00	28.14536	17.75477	8.93459	5.36252	3.58430	2.57857	1.95574	1.54117	1.25183
20.00	35.26293	21.36641	9.79830	5.64014	3.71170	2.65562	2.01082	1.58552	1.28900
30.00	42.67041	23.86831	11.04180	6.54936	4.39534	3.18319	2.42977	1.92673	1.57289
40.00	51.50631	30.51764	14.65759	8.60912	5.68973	4.06452	3.06617	2.40862	1.95173
50.00	75.14213	42.70768	17.78572	9.54248	5.97196	4.11713	3.03034	2.33630	1.86515
60.00	100.80430	46.13798	16.79263	8.74547	5.42222	3.72426	2.73492	2.10718	1.68144
70.00	101.95941	44.78085	16.47204	8.66689	5.40984	3.73430	2.75385	2.12930	1.70428
80.00	105.74357	44.38129	15.35282	7.82439	4.79286	3.26679	2.38673	1.83100	1.45650
90.00	80.01857	33.05009	11.49874	5.89787	3.62903	2.48172	1.81843	1.39838	1.11483
100.00	59.51776	24.94953	8.76785	4.50559	2.76975	1.89012	1.38131	1.05940	0.84203
110.00	65.52902	27.31223	9.48730	4.85274	2.97855	2.03236	1.48655	1.14132	0.90853
120.00	60.58604	28.74658	10.61588	5.51513	3.40733	2.33413	1.71153	1.31673	1.04981
130.00	44.66441	22.80698	9.60564	5.31322	3.39602	2.37578	1.76722	1.37389	1.10461
140.00	36.50793	19.44244	7.94609	4.37891	2.81795	1.98713	1.48995	1.16588	0.94229
150.00	33.61892	16.54817	7.22020	4.10457	2.66059	1.87578	1.40040	1.09242	0.87983
160.00	40.64050	18.38274	6.86890	3.72766	2.39456	1.68972	1.26773	0.99274	0.80382
170.00	44.72834	23.31790	8.82531	4.56522	2.80725	1.91599	1.40159	1.07599	0.85662
180.00	38.68114	24.36924	11.09864	6.14005	3.88138	2.68320	1.97517	1.52219	1.21392
190.00	27.56069	19.78045	10.75212	6.58399	4.43769	3.20550	2.43666	1.92352	1.56469
200.00	18.63841	13.61090	8.08773	5.34346	3.80196	2.85656	2.23731	1.80917	1.50030
210.00	13.08848	9.37028	5.53278	3.67581	2.64514	2.01347	1.59732	1.30744	1.09679
220.00	10.54823	7.05632	3.90973	2.54652	1.81828	1.37891	1.09156	0.89210	0.74733
230.00	8.96087	6.11766	3.33490	2.10657	1.46459	1.08717	0.84560	0.68118	0.56372
240.00	6.87551	4.81186	2.74472	1.79114	1.27509	0.96424	0.76171	0.62177	0.52075
250.00	5.12725	3.51650	1.97415	1.28273	0.91315	0.69113	0.54688	0.44729	0.37522
260.00	4.19075	2.78756	1.50583	0.95428	0.66670	0.49694	0.38800	0.31338	0.25986
270.00	4.05927	2.66777	1.41858	0.88931	0.61574	0.45540	0.35284	0.28331	0.23372
280.00	4.79988	3.20560	1.74038	1.10485	0.77151	0.57436	0.44743	0.36075	0.29882
290.00	6.65738	4.58350	2.57866	1.67303	1.18634	0.89390	0.70337	0.57184	0.47713
300.00	9.00043	6.18211	3.43852	2.20630	1.54973	1.15761	0.90399	0.73021	0.60584
310.00	10.77440	7.19640	3.87492	2.44282	1.69546	1.25451	0.97227	0.77993	0.64262
320.00	12.19484	8.18305	4.48554	2.86432	2.00572	1.49398	1.16200	0.93536	0.77296
330.00	14.65001	9.94662	5.35902	3.33632	2.28601	1.67363	1.28657	1.02408	0.83787
340.00	17.55362	11.31391	5.80523	3.56939	2.43925	1.78585	1.37165	1.09138	0.89490
350.00	19.78535	12.63406	6.50073	4.00060	2.73433	2.00244	1.53906	1.22760	1.00598
360.00	23.10616	14.76872	7.55768	4.62083	3.14742	2.30067	1.76884	1.40940	1.15547

400292

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 1000.00
10.00	1.04162
20.00	1.07431
30.00	1.31438
40.00	1.61957
50.00	1.52999
60.00	1.37867
70.00	1.40153
80.00	1.19100
90.00	0.91362
100.00	0.68796
110.00	0.74356
120.00	0.86076
130.00	0.91118
140.00	0.78154
150.00	0.72657
160.00	0.66647
170.00	0.70025
180.00	0.99440
190.00	1.30349
200.00	1.27031
210.00	0.93851
220.00	0.63879
230.00	0.47668
240.00	0.44516
250.00	0.32135
260.00	0.21996
270.00	0.19703
280.00	0.25299
290.00	0.40634
300.00	0.51270
310.00	0.54095
320.00	0.65232
330.00	0.70208
340.00	0.74879
350.00	0.84196
360.00	0.96881

400293

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
-51.00	96.60	22.30708	-30.10	83.00	32.75460
-9.00	69.50	52.77715	13.10	57.80	95.46042
35.50	46.80	191.87207	53.80	30.40	597.65594
66.90	9.10	5045.43604	84.30	-8.70	880.58563
75.10	-28.30	661.15338	59.70	-48.00	352.74817
44.20	-67.70	218.88957	28.80	-87.40	119.86945
13.40	-107.00	71.09514	-2.00	-126.70	45.89551
-19.60	-111.20	35.03457	-37.30	-93.60	24.91584
-54.90	-75.90	19.96991	-60.20	-58.00	17.96728
-78.50	-40.90	11.13144	-96.10	-39.00	8.31040
-113.90	-21.50	5.92964	-126.50	-2.00	5.10719
-111.90	18.00	6.76367	-96.60	37.80	10.63537
-81.30	57.60	16.16099	-65.90	77.30	19.82232

400294

CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE POLAR RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

ORIGIN SRCID		DIST (M)	DIR (DEG)	CONC	ORIGIN SRCID		DIST (M)	DIR (DEG)	CONC
ORIGIN	:	75.00	10.00	71.32362	ORIGIN	:	100.00	10.00	50.11951
ORIGIN	:	75.00	20.00	90.34276	ORIGIN	:	100.00	20.00	64.17911
ORIGIN	:	75.00	30.00	121.65277	ORIGIN	:	100.00	30.00	85.85202
ORIGIN	:	75.00	40.00	175.27205	ORIGIN	:	100.00	40.00	117.16309
ORIGIN	:	75.00	50.00	273.54709	ORIGIN	:	100.00	50.00	156.68513
ORIGIN	:	75.00	60.00	448.83673	ORIGIN	:	100.00	60.00	258.88736
ORIGIN	:	75.00	70.00	912.73254	ORIGIN	:	100.00	70.00	415.15811
ORIGIN	:	75.00	80.00	2173.17432	ORIGIN	:	100.00	80.00	483.61688
ORIGIN	:	100.00	90.00	425.03821	ORIGIN	:	100.00	100.00	302.12610
ORIGIN	:	100.00	110.00	291.74728	ORIGIN	:	100.00	120.00	180.93118
ORIGIN	:	100.00	130.00	124.19179	ORIGIN	:	100.00	140.00	111.75304
ORIGIN	:	100.00	150.00	120.31593	ORIGIN	:	100.00	160.00	110.60722
ORIGIN	:	100.00	210.00	20.55724	ORIGIN	:	100.00	220.00	17.33973
ORIGIN	:	100.00	230.00	13.92261	ORIGIN	:	100.00	240.00	10.59334
ORIGIN	:	100.00	310.00	17.61814	ORIGIN	:	100.00	340.00	28.95517
ORIGIN	:	75.00	350.00	47.15836	ORIGIN	:	100.00	350.00	35.15954
ORIGIN	:	75.00	360.00	58.49636	ORIGIN	:	100.00	360.00	41.19137

400295

CONC URBAN FLAT DFAULT NOCMPL

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 150.00	200.00	300.00	400.00	500.00
10.0	533.34753 (89091324)	395.96191 (89091324)	182.24754 (89091324)	111.27405 (89012308)	87.48795 (89052008)
20.0	747.73773 (89091324)	472.01886 (89052008)	264.82523 (89052008)	138.47940 (89052008)	82.75275 (89012308)
30.0	1113.47473 (89052008)	529.58624 (89052008)	251.93611c(89103008)	189.06799c(89103008)	133.94279c(89103008)
40.0	925.70514c(89103008)	842.16260c(89103008)	264.55093c(89103008)	162.22247 (89111808)	118.61131 (89111808)
50.0	1420.79163c(89103008)	867.36346 (89111808)	340.23553 (89111808)	149.79198 (89111808)	102.47224c(89070108)
60.0	1690.39063 (89111808)	787.15247c(89070108)	250.96022 (89121424)	150.42581 (89121424)	98.80489 (89121424)
70.0	1569.00208 (89121424)	617.51746 (89121424)	255.54990 (89100308)	162.39105 (89100308)	112.09946 (89100308)
80.0	2286.24170 (89100308)	960.05493 (89100308)	321.40646 (89021908)	180.11603 (89021908)	116.44286 (89021908)
90.0	1585.78394 (89080208)	656.07843 (89080208)	238.70097c(89031108)	129.95537c(89031108)	83.48181c(89031108)
100.0	1155.07983 (89071408)	475.43515 (89071408)	161.02289 (89071408)	81.67179 (89071408)	50.31733 (89111908)
110.0	1373.76575c(89011608)	627.44379 (89041408)	231.11514 (89041408)	116.00650 (89041408)	69.89086 (89041408)
120.0	1172.58081 (89042008)	619.32068 (89042008)	207.11533 (89042008)	112.68785c(89011608)	77.43970c(89011608)
130.0	902.09839c(89111308)	491.29691 (89121124)	184.56332 (89121124)	106.61329 (89042008)	72.37459 (89042008)
140.0	716.57770c(89102624)	343.28998 (89091224)	168.29945c(89111308)	101.47945c(89111308)	66.02194c(89111308)
150.0	971.76764c(89102708)	390.80411c(89092108)	157.73859c(89102624)	89.97231c(89102624)	53.48957c(89102624)
160.0	1219.36975c(89102608)	644.89948c(89102708)	183.41225 (89081708)	97.61700 (89091308)	61.45941 (89091308)
170.0	889.74072c(89032008)	713.57117c(89102608)	251.84093c(89102708)	167.81261c(89102708)	110.67759c(89102708)
180.0	882.52875 (89051808)	463.91550c(89090708)	272.62271c(89102608)	190.60823c(89102608)	131.58937c(89102608)
190.0	593.98724c(89102808)	501.95624 (89051808)	234.09775 (89051808)	124.23566 (89100108)	90.75633 (89100108)
200.0	509.25986c(89102624)	346.48676 (89032308)	174.96663c(89102808)	134.07570 (89051808)	103.76409 (89051808)
210.0	311.20840c(89102624)	287.33145c(89102624)	162.73648c(89102624)	109.57570 (89032308)	78.42043 (89032308)
220.0	431.88889c(89102908)	258.96521c(89102908)	91.95821c(89102908)	69.46369c(89102624)	56.17533c(89102624)
230.0	291.75287 (89041008)	193.72241c(89102908)	139.77748c(89102908)	96.73234c(89102908)	69.41792c(89102908)
240.0	224.70767 (89110224)	154.75256 (89110224)	93.40467 (89041008)	65.03172 (89041008)	47.57175 (89041008)
250.0	148.57944 (89062308)	91.30357 (89062308)	58.55696 (89110224)	41.65379 (89110224)	31.21841 (89110224)
260.0	228.99709 (89062224)	146.03465 (89062224)	74.06700 (89062224)	44.82016 (89062224)	30.08099 (89062224)
270.0	221.35609 (89062224)	152.08691 (89062224)	86.16784 (89062224)	56.49235 (89062224)	40.50436 (89062224)
280.0	129.69373 (89062324)	86.07426 (89062324)	47.33100 (89052608)	30.72682 (89052608)	21.86668 (89052608)
290.0	238.12158 (89051424)	168.71637 (89051424)	97.63714 (89051424)	64.32274 (89051424)	45.98980 (89051424)
300.0	312.71851 (89092124)	221.49092 (89092124)	122.29832 (89092124)	76.74704 (89092124)	53.26594 (89040424)
310.0	324.09332 (89072208)	244.73688 (89072208)	144.26714 (89072208)	93.12443 (89072208)	65.13377 (89072208)
320.0	410.47256 (89072208)	239.34308 (89072208)	135.86540 (89041308)	95.87597 (89043024)	71.23888 (89043024)
330.0	463.23596 (89041308)	345.05576 (89041308)	186.16095 (89041308)	110.04622 (89041308)	71.40749 (89041308)
340.0	564.82092 (89041308)	300.36365 (89041308)	166.19386 (89102924)	107.74055 (89102924)	74.70126 (89102924)
350.0	543.11926 (89102924)	349.86627 (89102924)	156.97514 (89070424)	81.83059 (89070424)	49.18519 (89032708)
360.0	554.27429 (89070424)	248.41521 (89070424)	157.57085 (89091324)	104.83116 (89091324)	73.12842 (89091324)

400296

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 600.00	700.00	800.00	900.00	1000.00
10.0	69.19898 (89052008)	55.45448 (89052008)	45.37210 (89052008)	37.82990 (89052008)	32.16431 (89052008)
20.0	55.76757 (89012308)	40.06626 (89012308)	30.23446 (89012308)	23.77265 (89052008)	19.44928 (89090908)
30.0	97.37085c(89103008)	73.36252c(89103008)	57.11519c(89103008)	45.75517c(89103008)	37.53928c(89103008)
40.0	89.68171 (89111808)	70.19755 (89111808)	56.51519 (89111808)	46.64432 (89111808)	39.33643 (89111808)
50.0	75.46510c(89070108)	58.23467c(89070108)	46.44919c(89070108)	38.11587c(89070108)	31.96214c(89070108)
60.0	70.01243 (89121424)	52.40825 (89121424)	40.98164 (89121424)	33.03687 (89121424)	27.34452 (89121424)
70.0	82.52171 (89100308)	63.71761 (89100308)	51.08105 (89100308)	42.08371 (89100308)	35.45377 (89100308)
80.0	82.41963 (89021908)	62.05375 (89021908)	48.81989 (89021908)	39.67923 (89021908)	33.08344 (89021908)
90.0	59.11205c(89031108)	44.60086c(89031108)	35.20341c(89031108)	28.73846c(89031108)	24.07033c(89031108)
100.0	34.71393 (89111908)	25.64815 (89111908)	19.90675 (89111908)	15.99554 (89111908)	13.21714 (89111908)
110.0	47.03825 (89041408)	34.06337 (89041408)	25.89410 (89041408)	20.52291 (89041408)	16.70069 (89022524)
120.0	56.52633c(89011608)	43.37174c(89011608)	34.51241c(89011608)	28.33360c(89011608)	23.76766c(89011608)
130.0	52.72333 (89042008)	40.34512 (89042008)	32.01023 (89042008)	26.26134 (89042008)	21.97768 (89042008)
140.0	50.03787 (89032116)	43.06928 (89032116)	37.75822 (89032116)	33.76230 (89032116)	30.32611 (89032116)
150.0	36.72762c(89101208)	27.20870c(89101208)	20.89081c(89101208)	17.51114 (89032116)	16.52346 (89032116)
160.0	41.22725c(89092108)	29.29173 (89091308)	21.75092 (89091308)	16.65731 (89091308)	13.99021c(89102624)
170.0	75.89196c(89102708)	54.51280c(89102708)	40.66885c(89102708)	31.39091c(89102708)	24.89466c(89102708)
180.0	93.95004c(89102608)	69.94064c(89102608)	53.93844c(89102608)	42.79472c(89102608)	34.77549c(89102608)
190.0	67.69848c(89090708)	52.74288c(89090708)	42.29092c(89090708)	34.78067c(89090708)	29.13733c(89090708)
200.0	80.54482 (89051808)	63.74577 (89051808)	51.55618 (89051808)	42.58135 (89051808)	35.80720 (89051808)
210.0	57.77363 (89032308)	44.39304c(89102808)	36.19741c(89102808)	30.18635c(89102808)	25.53654c(89102808)
220.0	45.59392c(89102624)	37.52863c(89102624)	31.48416c(89102624)	26.78987c(89102624)	23.17387c(89102624)
230.0	52.03519c(89102908)	40.48518c(89102908)	32.47274c(89102908)	26.69104c(89102908)	22.42713c(89102908)
240.0	36.44781 (89041008)	28.97203 (89041008)	23.67263 (89041008)	19.79720 (89041008)	16.88378 (89041008)
250.0	24.41501 (89110224)	19.71519 (89110224)	16.37880 (89110224)	13.85897 (89110224)	11.94991 (89110224)
260.0	21.80753c(89101508)	17.33083c(89101508)	14.21418c(89101508)	11.94214c(89101508)	10.23033c(89101508)
270.0	30.78363 (89062224)	24.41268 (89062224)	19.97847 (89062224)	16.76818 (89062224)	14.35197 (89062224)
280.0	16.58966 (89052608)	13.20380 (89052608)	10.90120 (89052608)	9.59101 (89040416)	8.76672 (89040416)
290.0	34.88337 (89040424)	28.65322 (89040424)	24.20523 (89040424)	20.86803 (89040424)	18.28676 (89040424)
300.0	40.15983 (89040424)	31.63446 (89040424)	25.85681 (89040424)	21.62457 (89040424)	18.49508 (89040424)
310.0	48.23256 (89072208)	37.38680 (89072208)	29.88792 (89072208)	24.61935 (89072208)	20.72308 (89072208)
320.0	54.85524 (89043024)	43.64514 (89041308)	35.83404 (89041308)	30.07558 (89041308)	25.69857 (89041308)
330.0	50.08646 (89041308)	37.05096 (89041308)	28.47974 (89041308)	22.93806 (89102924)	19.21943 (89102924)
340.0	54.35371 (89102924)	41.30373 (89102924)	32.59362 (89102924)	26.28332 (89102924)	22.10792 (89070424)
350.0	37.69039c(89012324)	30.27300c(89012324)	24.86798c(89012324)	20.76952c(89012324)	17.77252c(89012324)
360.0	53.80104 (89091324)	41.36442 (89091324)	32.83833 (89091324)	26.86869 (89091324)	22.44330 (89091324)

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
-51.00	96.60	614.27393	(89041308)	-30.10	83.00	974.10535	(89041308)
-9.00	69.50	1692.49365	(89041308)	13.10	57.80	2922.47852	(89041308)
35.50	46.80	4976.27588	(89102924)	53.80	30.40	11770.18950	(89091324)
66.90	9.10	50755.75390	(89111808)	84.30	-8.70	10135.95120c	(89060208)
75.10	-28.30	11799.00680	(89121124)	59.70	-48.00	9260.51367c	(89102708)
44.20	-67.70	4021.88867c	(89090708)	28.80	-87.40	2335.71362	(89051808)
13.40	-107.00	1696.43372	(89051808)	-2.00	-126.70	1101.42786	(89051808)
-19.60	-111.20	895.51746	(89032308)	-37.30	-93.60	555.22504c	(89102624)
-54.90	-75.90	702.71906c	(89102908)	-60.20	-58.00	540.15466	(89041008)
-78.50	-40.90	274.95056	(89110224)	-96.10	-39.00	244.92703	(89062308)
-113.90	-21.50	324.61691	(89062224)	-126.50	-2.00	285.52335	(89062224)
-111.90	18.00	184.08569	(89062324)	-96.60	37.80	368.81894	(89051424)
-81.30	57.60	550.63257	(89092124)	-65.90	77.30	664.79712	(89072208)

400298

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE POLAR RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC	(YYMMDDHH)	ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC	(YYMMDDHH)
ORIGIN :	75.00	10.00	1851.13672	(89102924)	ORIGIN :	100.00	10.00	1216.75037	(89070424)
ORIGIN :	75.00	20.00	2330.98511	(89102924)	ORIGIN :	100.00	20.00	1083.84656c	(89012324)
ORIGIN :	75.00	30.00	2341.51123	(89070424)	ORIGIN :	100.00	30.00	1866.96362	(89091324)
ORIGIN :	75.00	40.00	3496.01196	(89091324)	ORIGIN :	100.00	40.00	2613.56006	(89052008)
ORIGIN :	75.00	50.00	5397.84326	(89091324)	ORIGIN :	100.00	50.00	3146.89551	(89052008)
ORIGIN :	75.00	60.00	10474.85060	(89052008)	ORIGIN :	100.00	60.00	5341.65186c	(89103008)
ORIGIN :	75.00	70.00	15869.21390c	(89103008)	ORIGIN :	100.00	70.00	6012.15479	(89111808)
ORIGIN :	75.00	80.00	23531.91990	(89111808)	ORIGIN :	100.00	80.00	5980.93604c	(89051408)
ORIGIN :	100.00	90.00	7337.24170	(89021908)	ORIGIN :	100.00	100.00	5158.71631	(89022524)
ORIGIN :	100.00	110.00	5670.97461	(89042008)	ORIGIN :	100.00	120.00	3377.80664c	(89111308)
ORIGIN :	100.00	130.00	2444.16138c	(89092108)	ORIGIN :	100.00	140.00	3631.32251c	(89102708)
ORIGIN :	100.00	150.00	3500.77759c	(89102608)	ORIGIN :	100.00	160.00	2059.11060c	(89090708)
ORIGIN :	100.00	210.00	764.51825c	(89102908)	ORIGIN :	100.00	220.00	529.78809c	(89102908)
ORIGIN :	100.00	230.00	417.94730	(89041008)	ORIGIN :	100.00	240.00	315.35660	(89110224)
ORIGIN :	100.00	310.00	562.35480	(89092124)	ORIGIN :	100.00	340.00	932.87091	(89041308)
ORIGIN :	75.00	350.00	1519.29834	(89041308)	ORIGIN :	100.00	350.00	1091.73181	(89041308)
ORIGIN :	75.00	360.00	1808.37415	(89041308)	ORIGIN :	100.00	360.00	1101.08289	(89102924)

400299

*** THE SUMMARY OF MAXIMUM PERIOD (8760 HRS) RESULTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

GROUP ID		AVERAGE CONC	RECEPTOR (XR,	YR,	ZELEV,	ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	1ST HIGHEST VALUE IS	5045.43604 AT (	66.90,	9.10,	0.00,	0.00)	DC	NA
	2ND HIGHEST VALUE IS	2173.17432 AT (	73.86,	13.02,	0.00,	0.00)	DP	NA
	3RD HIGHEST VALUE IS	912.73254 AT (	70.48,	25.65,	0.00,	0.00)	DP	NA
	4TH HIGHEST VALUE IS	880.58563 AT (	84.30,	-8.70,	0.00,	0.00)	DC	NA
	5TH HIGHEST VALUE IS	661.15338 AT (	75.10,	-28.30,	0.00,	0.00)	DC	NA
	6TH HIGHEST VALUE IS	597.65594 AT (	53.80,	30.40,	0.00,	0.00)	DC	NA
	7TH HIGHEST VALUE IS	483.61688 AT (	98.48,	17.36,	0.00,	0.00)	DP	NA
	8TH HIGHEST VALUE IS	448.83673 AT (	64.95,	37.50,	0.00,	0.00)	DP	NA
	9TH HIGHEST VALUE IS	425.03821 AT (	100.00,	0.00,	0.00,	0.00)	DP	NA
	10TH HIGHEST VALUE IS	415.15811 AT (	93.97,	34.20,	0.00,	0.00)	DP	NA

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

400300

**MODELOPTs:
CONC   URBAN   FLAT   DFAULT   NOCMPL

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	50755.75390	ON 89111808: AT (	66.90, 9.10, 0.00, 0.00)	DC	NA

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

400301

```
**MODELOPTs:
CONC                         URBAN  FLAT          DFAULT                                                  NOCMPL

*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of             0 Fatal Error Message(s)
A Total of             1 Warning Message(s)
A Total of           169 Informational Message(s)

A Total of           169 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
SO W320    17 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

400302

1990 METEOROLOGICAL DATA

```
CO STARTING
CO TITLEONE 1990 Carlstadt, Vinyl Chloride Impacts from Excavation Site
CO TITLETWO Newark/Atlantic City Meteorology, 1987 - 1991 (3/29/91)
CO MODELOPT DFAULT CONC   URBAN  NOCMPL
CO AVERTIME PERIOD 8
CO POLLUTID OTHER
CO DCAYCOEF    .000000
CO RUNORNOT RUN
CO FINISHED

SO STARTING
** Source Location Cards:
**          SRCID SRCTYP      XS     YS      ZS
**                           (m)    (m)     (m)
** SOURCE ORIGIN ONLY USED FOR RECEPTOR PLACEMENT
SO LOCATION ORIGIN POINT      0.0   0.0      0.0
SO SRCPARAM ORIGIN 0.0  10  300 10.0 3.0

** SOURCE ORIGIN FOR AREAPOLY
**          SRCID SRCTYP      XS     YS .    ZS
**                           (m)    (m)     (m)
SO LOCATION SRC1  AREAPOLY   56.05  0.0      0.0

** Source Parameter Cards:
** AREAPOLY SOURCE
**                 Q         RH     NoVert.   Sz(optional)
**      SRCID    (g/s/m2)   (m)     (#)       (m)
SO SRCPARAM SRC1  0.017521    0.00    5
SO AREAVERT SRC1   56.05  0.00    54.12  6.69   61.11  4.31
SO AREAVERT SRC1   65.72 -8.92    59.62 -14.12
SO EMISUNIT    .100000E+07 (GRAMS/SEC)          (MICROGRAMS/CUBIC-METER)
SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE GRIDPOLR POL STA
RE GRIDPOLR POL ORIG  0.0   0.0
RE GRIDPOLR POL DIST  150 200 300 400 500 600 700 800 900 1000
RE GRIDPOLR POL GDIR  36  10.00  10.00
RE GRIDPOLR POL END
**  FENCELINE RECEPTORS AT  25-M INTERVALS
RE DISCCART      -51.0      96.6
RE DISCCART      -30.1      83.0
RE DISCCART       -9.0      69.5
RE DISCCART       13.1      57.8
RE DISCCART       35.5      46.8
RE DISCCART       53.8      30.4
RE DISCCART       66.9       9.1
RE DISCCART       84.3      -8.7
RE DISCCART       75.1     -28.3
RE DISCCART       59.7     -48.0
```

400304

```
RE DISCCART        44.2      -67.7
RE DISCCART        28.8      -87.4
RE DISCCART        13.4     -107.0
RE DISCCART        -2.0     -126.7
RE DISCCART       -19.6     -111.2
RE DISCCART       -37.3      -93.6
RE DISCCART       -54.9      -75.9
RE DISCCART       -60.2      -58.0
RE DISCCART       -78.5      -40.9
RE DISCCART       -96.1      -39.0
RE DISCCART      -113.9      -21.5
RE DISCCART      -126.5       -2.0
RE DISCCART      -111.9       18.0
RE DISCCART       -96.6       37.8
RE DISCCART       -81.3       57.6
RE DISCCART       -65.9       77.3
RE DISCPOLR ORIGIN        75.         10
RE DISCPOLR ORIGIN       100.        10
RE DISCPOLR ORIGIN        75.         20
RE DISCPOLR ORIGIN       100.         20
RE DISCPOLR ORIGIN        75.         30
RE DISCPOLR ORIGIN       100.         30
RE DISCPOLR ORIGIN        75.         40
RE DISCPOLR ORIGIN       100.         40
RE DISCPOLR ORIGIN        75.         50
RE DISCPOLR ORIGIN       100.         50
RE DISCPOLR ORIGIN        75.         60
RE DISCPOLR ORIGIN       100.         60
RE DISCPOLR ORIGIN        75.         70
RE DISCPOLR ORIGIN       100.         70
RE DISCPOLR ORIGIN        75.         80
RE DISCPOLR ORIGIN       100.         80
RE DISCPOLR ORIGIN       100.         90
RE DISCPOLR ORIGIN       100.        100
RE DISCPOLR ORIGIN       100.        110
RE DISCPOLR ORIGIN       100.        120
RE DISCPOLR ORIGIN       100.        130
RE DISCPOLR ORIGIN       100.        140
RE DISCPOLR ORIGIN       100.        150
RE DISCPOLR ORIGIN       100.        160
RE DISCPOLR ORIGIN       100.        210
RE DISCPOLR ORIGIN       100.        220
RE DISCPOLR ORIGIN       100.        230
RE DISCPOLR ORIGIN       100.        240
RE DISCPOLR ORIGIN       100.        310
RE DISCPOLR ORIGIN       100.        340
RE DISCPOLR ORIGIN        75.        350
RE DISCPOLR ORIGIN       100.        350
RE DISCPOLR ORIGIN        75.        360
RE DISCPOLR ORIGIN       100.        360
RE FINISHED
```

```
ME STARTING
ME INPUTFIL EWKACY90.MET
ME ANEMHGHT  20 FEET
ME SURFDATA  14734      1990        NEWARK
ME UAIRDATA  93755      1990        ATLANTIC_CITY
ME WINDCATS    1.54     3.09     5.14     8.23    10.80
ME FINISHED

OU STARTING
OU RECTABLE ALLAVE FIRST
OU PLOTFILE 8 ALL FIRST 08.P90
OU FINISHED

 *** Message Summary For ISC3 Model Setup ***

 --------- Summary of Total Messages --------

A Total of            0 Fatal Error Message(s)
A Total of            1 Warning Message(s)
A Total of            0 Informational Message(s)


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
SO W320    17 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

***********************************
*** SETUP Finishes Successfully ***
***********************************
```

```
**MODELOPTs:
CONC                         URBAN  FLAT          DFAULT                                       NOCMPL

                              ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Simple Terrain Model is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  1 Short Term Average(s) of:   8-HR
    and Calculates PERIOD Averages

**This Run Includes:     2 Source(s);      1 Source Group(s); and     420 Receptor(s)

**The Model Assumes A Pollutant Type of:  OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of PERIOD Averages by Receptor
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
```

b for Both Calm and Missing Hours

```
**Misc. Inputs:  Anem. Hgt. (m) =     6.10 ;    Decay Coef. =    0.000      ;    Rot. Angle =     0.0
                 Emission Units = (GRAMS/SEC)                               ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = (MICROGRAMS/CUBIC-METER)

**Approximate Storage Requirements of Model =     1.2 MB of RAM.

**Input Runstream File:          vinyl.i90
**Output Print File:             vinyl.o90
```

400308

**MODELOPTs:
CONC URBAN FLAT DFAULT NOCMPL

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BUILDING EXISTS	EMISSION RATE SCALAR VARY BY
ORIGIN	0	0.00000E+00	0.0	0.0	0.0	10.00	300.00	10.00	3.00	NO	

400309

*** AREAPOLY SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS /METER**2)	LOCATION OF AREA X (METERS)	LOCATION OF AREA Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	NUMBER OF VERTS.	INIT. SZ (METERS)	EMISSION RATE SCALAR VARY BY
SRC1	0	0.17521E-01	56.0	0.0	0.0	0.00	5	0.00	

400310

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID	SOURCE IDs
ALL	ORIGIN , SRC1 ,

400311

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

*** ORIGIN FOR POLAR NETWORK ***
X-ORIG = 0.00 ; Y-ORIG = 0.00 (METERS)

*** DISTANCE RANGES OF NETWORK ***
(METERS)

150.0,	200.0,	300.0,	400.0,	500.0,	600.0,	700.0,	800.0,	900.0,	1000.0,

*** DIRECTION RADIALS OF NETWORK ***
(DEGREES)

10.0,	20.0,	30.0,	40.0,	50.0,	60.0,	70.0,	80.0,	90.0,	100.0,
110.0,	120.0,	130.0,	140.0,	150.0,	160.0,	170.0,	180.0,	190.0,	200.0,
210.0,	220.0,	230.0,	240.0,	250.0,	260.0,	270.0,	280.0,	290.0,	300.0,
310.0,	320.0,	330.0,	340.0,	350.0,	360.0,				

400312

**MODELOPTs:
CONC URBAN FLAT DFAULT NOCMPL

*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZFLAG)
(METERS)

```
(    -51.0,     96.6,     0.0,     0.0);     (    -30.1,     83.0,     0.0,     0.0);
(     -9.0,     69.5,     0.0,     0.0);     (     13.1,     57.8,     0.0,     0.0);
(     35.5,     46.8,     0.0,     0.0);     (     53.8,     30.4,     0.0,     0.0);
(     66.9,      9.1,     0.0,     0.0);     (     84.3,     -8.7,     0.0,     0.0);
(     75.1,    -28.3,     0.0,     0.0);     (     59.7,    -48.0,     0.0,     0.0);
(     44.2,    -67.7,     0.0,     0.0);     (     28.8,    -87.4,     0.0,     0.0);
(     13.4,   -107.0,     0.0,     0.0);     (     -2.0,   -126.7,     0.0,     0.0);
(    -19.6,   -111.2,     0.0,     0.0);     (    -37.3,    -93.6,     0.0,     0.0);
(    -54.9,    -75.9,     0.0,     0.0);     (    -60.2,    -58.0,     0.0,     0.0);
(    -78.5,    -40.9,     0.0,     0.0);     (    -96.1,    -39.0,     0.0,     0.0);
(   -113.9,    -21.5,     0.0,     0.0);     (   -126.5,     -2.0,     0.0,     0.0);
(   -111.9,     18.0,     0.0,     0.0);     (    -96.6,     37.8,     0.0,     0.0);
(    -81.3,     57.6,     0.0,     0.0);     (    -65.9,     77.3,     0.0,     0.0);
```

400313

*** DISCRETE POLAR RECEPTORS ***
ORIGIN: (DIST, DIR, ZELEV, ZFLAG)
SRCID: (METERS,DEG,METERS,METERS)

```
ORIGIN  : (    75.0,    10.0,     0.0,     0.0);      ORIGIN  : (   100.0,    10.0,     0.0,     0.0);
ORIGIN  : (    75.0,    20.0,     0.0,     0.0);      ORIGIN  : (   100.0,    20.0,     0.0,     0.0);
ORIGIN  : (    75.0,    30.0,     0.0,     0.0);      ORIGIN  : (   100.0,    30.0,     0.0,     0.0);
ORIGIN  : (    75.0,    40.0,     0.0,     0.0);      ORIGIN  : (   100.0,    40.0,     0.0,     0.0);
ORIGIN  : (    75.0,    50.0,     0.0,     0.0);      ORIGIN  : (   100.0,    50.0,     0.0,     0.0);
ORIGIN  : (    75.0,    60.0,     0.0,     0.0);      ORIGIN  : (   100.0,    60.0,     0.0,     0.0);
ORIGIN  : (    75.0,    70.0,     0.0,     0.0);      ORIGIN  : (   100.0,    70.0,     0.0,     0.0);
ORIGIN  : (    75.0,    80.0,     0.0,     0.0);      ORIGIN  : (   100.0,    80.0,     0.0,     0.0);
ORIGIN  : (   100.0,    90.0,     0.0,     0.0);      ORIGIN  : (   100.0,   100.0,     0.0,     0.0);
ORIGIN  : (   100.0,   110.0,     0.0,     0.0);      ORIGIN  : (   100.0,   120.0,     0.0,     0.0);
ORIGIN  : (   100.0,   130.0,     0.0,     0.0);      ORIGIN  : (   100.0,   140.0,     0.0,     0.0);
ORIGIN  : (   100.0,   150.0,     0.0,     0.0);      ORIGIN  : (   100.0,   160.0,     0.0,     0.0);
ORIGIN  : (   100.0,   210.0,     0.0,     0.0);      ORIGIN  : (   100.0,   220.0,     0.0,     0.0);
ORIGIN  : (   100.0,   230.0,     0.0,     0.0);      ORIGIN  : (   100.0,   240.0,     0.0,     0.0);
ORIGIN  : (   100.0,   310.0,     0.0,     0.0);      ORIGIN  : (   100.0,   340.0,     0.0,     0.0);
ORIGIN  : (    75.0,   350.0,     0.0,     0.0);      ORIGIN  : (   100.0,   350.0,     0.0,     0.0);
ORIGIN  : (    75.0,   360.0,     0.0,     0.0);      ORIGIN  : (   100.0,   360.0,     0.0,     0.0);
```

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
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1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
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NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
B	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
C	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00
D	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00
E	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00
F	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01

F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: EWKACY90.MET
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.: 14734   UPPER AIR STATION NO.: 93755
NAME: NEWARK   NAME: ATLANTIC_CITY
YEAR: 1990   YEAR: 1990

YR MN DY HR	FLOW VECTOR	SPEED (M/S)	TEMP (K)	STAB CLASS	MIXING HEIGHT (M) RURAL	MIXING HEIGHT (M) URBAN	USTAR (M/S)	M-O LENGTH (M)	Z-0 (M)	IPCODE	PRATE (mm/HR)
90 01 01 01	21.0	2.57	279.8	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 02	88.0	4.12	280.9	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 03	84.0	5.14	280.4	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 04	63.0	4.12	279.8	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 05	63.0	6.17	278.7	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 06	62.0	5.66	278.2	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 07	75.0	6.69	278.2	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 08	83.0	6.69	277.6	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 09	67.0	8.23	277.6	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 10	91.0	7.20	278.2	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 11	94.0	8.75	278.7	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 12	96.0	11.32	278.2	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 13	103.0	10.29	278.2	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 14	99.0	10.80	277.6	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 15	112.0	10.29	277.6	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 16	124.0	10.29	276.5	4	10.0	10.0	0.0000	0.0	0.0000	0	0.00
90 01 01 17	111.0	10.29	275.9	4	28.9	28.9	0.0000	0.0	0.0000	0	0.00
90 01 01 18	107.0	8.75	275.4	4	72.6	72.6	0.0000	0.0	0.0000	0	0.00
90 01 01 19	134.0	7.72	275.4	4	116.2	116.2	0.0000	0.0	0.0000	0	0.00
90 01 01 20	117.0	6.69	274.8	4	159.9	159.9	0.0000	0.0	0.0000	0	0.00
90 01 01 21	120.0	7.20	274.3	4	203.6	203.6	0.0000	0.0	0.0000	0	0.00
90 01 01 22	132.0	10.29	274.3	4	247.2	247.2	0.0000	0.0	0.0000	0	0.00
90 01 01 23	130.0	3.60	273.7	5	290.9	86.2	0.0000	0.0	0.0000	0	0.00
90 01 01 24	110.0	6.17	273.1	4	334.6	334.6	0.0000	0.0	0.0000	0	0.00

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 150.00	200.00	300.00	400.00	500.00	600.00	700.00	800.00	900.00
10.00	37.20151	24.65714	12.15217	7.15380	4.75076	3.41221	2.58838	2.04144	1.65917
20.00	48.53139	28.60016	13.54905	8.12880	5.50640	4.01621	3.08176	2.45313	2.00878
30.00	58.03053	35.14273	17.54971	10.55808	7.08531	5.11414	3.88746	3.07042	2.49757
40.00	80.12582	48.51027	21.86153	12.21654	7.83537	5.49274	4.09139	3.18515	2.56288
50.00	112.43317	57.57447	22.38886	11.72637	7.23028	4.93123	3.59950	2.75681	2.18925
60.00	125.36302	53.69413	18.52541	9.53572	5.90174	4.05830	2.98786	2.30886	1.84808
70.00	110.18340	47.01593	16.57729	8.51260	5.24011	3.58653	2.63047	2.02619	1.61748
80.00	98.20577	40.66306	14.16295	7.27593	4.48721	3.07706	2.26118	1.74417	1.39475
90.00	76.71162	31.91923	11.22857	5.80991	3.60217	2.48108	1.82987	1.41606	1.13551
100.00	58.34125	24.82879	8.87563	4.61217	2.86062	1.96720	1.44711	1.11627	0.89197
110.00	59.07051	24.55404	8.63835	4.45689	2.75169	1.88538	1.38334	1.06450	0.84863
120.00	60.27303	27.49288	9.80527	5.00509	3.05767	2.07736	1.51271	1.15756	0.91821
130.00	42.73866	23.13244	9.66742	5.24488	3.30658	2.28945	1.68912	1.30410	1.04223
140.00	38.03483	18.32725	7.47887	4.24350	2.77267	1.96912	1.47984	1.15816	0.93551
150.00	38.04850	18.37775	7.33418	3.93179	2.45877	1.69421	1.24423	0.95912	0.76475
160.00	38.86829	19.97393	7.86071	4.20723	2.65481	1.84515	1.36799	1.06251	0.85372
170.00	36.28494	20.76938	8.86325	4.89536	3.11558	2.16703	1.60419	1.24136	0.99345
180.00	26.96881	18.58272	9.26628	5.36002	3.48774	2.46183	1.84096	1.43515	1.15516
190.00	18.43586	13.11912	7.58408	4.86706	3.37690	2.48493	1.91170	1.52156	1.24416
200.00	14.24314	9.53333	5.28163	3.42503	2.42694	1.82258	1.42740	1.15369	0.95577
210.00	12.04746	7.93425	4.20988	2.63418	1.81810	1.33873	1.03238	0.82405	0.67550
220.00	10.45720	6.92918	3.70745	2.31782	1.59421	1.16966	0.89893	0.71523	0.58476
230.00	9.34598	6.22332	3.32572	2.08415	1.43896	1.06087	0.81836	0.65382	0.53626
240.00	8.01023	5.44285	3.00308	1.91759	1.34018	0.99619	0.77399	0.62220	0.51343
250.00	6.80147	4.59962	2.52862	1.61343	1.12843	0.83883	0.65205	0.52414	0.43246
260.00	5.80568	3.89663	2.13017	1.35676	0.94793	0.70457	0.54761	0.44009	0.36291
270.00	5.46507	3.61043	1.93320	1.21498	0.84037	0.61975	0.47829	0.38201	0.31342
280.00	6.14641	4.10321	2.22433	1.40853	0.97999	0.72635	0.56322	0.45168	0.37208
290.00	7.04122	4.72380	2.57326	1.63314	1.13824	0.84472	0.65572	0.52652	0.43394
300.00	8.56993	5.89264	3.30384	2.13143	1.50198	1.12358	0.87790	0.70895	0.58750
310.00	11.03072	7.61775	4.26751	2.74880	1.93432	1.44596	1.12953	0.91112	0.75412
320.00	13.97116	9.60915	5.27779	3.32615	2.29755	1.69178	1.30461	1.04174	0.85445
330.00	16.75095	10.82361	5.49511	3.35166	2.28365	1.67105	1.28566	1.02586	0.83941
340.00	17.91849	11.47928	6.15686	3.91579	2.73488	2.02964	1.57273	1.26096	1.03763
350.00	21.01501	14.29179	7.78490	4.92368	3.42659	2.54102	1.97280	1.58369	1.30558
360.00	27.39055	18.55128	10.20657	6.40937	4.39665	3.21252	2.45961	1.95081	1.59119

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 1000.00
10.00	1.38091
20.00	1.68271
30.00	2.07945
40.00	2.11557
50.00	1.78726
60.00	1.52027
70.00	1.32741
80.00	1.14606
90.00	0.93578
100.00	0.73223
110.00	0.69558
120.00	0.74932
130.00	0.85504
140.00	0.77337
150.00	0.62618
160.00	0.70360
170.00	0.81680
180.00	0.95425
190.00	1.04024
200.00	0.80815
210.00	0.56591
220.00	0.48821
230.00	0.44938
240.00	0.43283
250.00	0.36423
260.00	0.30558
270.00	0.26274
280.00	0.31301
290.00	0.36551
300.00	0.49650
310.00	0.63718
320.00	0.71628
330.00	0.70347
340.00	0.87115
350.00	1.09723
360.00	1.32587

400319

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
-51.00	96.60	25.98721	-30.10	83.00	37.60107
-9.00	69.50	58.43454	13.10	57.80	98.06267
35.50	46.80	213.74818	53.80	30.40	803.63043
66.90	9.10	6524.39893	84.30	-8.70	847.77698
75.10	-28.30	646.58551	59.70	-48.00	353.89786
44.20	-67.70	174.96733	28.80	-87.40	86.35447
13.40	-107.00	48.51776	-2.00	-126.70	30.62003
-19.60	-111.20	25.49472	-37.30	-93.60	22.97534
-54.90	-75.90	20.07302	-60.20	-58.00	19.62893
-78.50	-40.90	14.22746	-96.10	-39.00	11.02326
-113.90	-21.50	8.16356	-126.50	-2.00	6.86664
-111.90	18.00	8.74283	-96.60	37.80	11.39785
-81.30	57.60	15.46704	-65.90	77.30	21.24792

400320

CONC URBAN FLAT DFAULT NOCMPL

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE POLAR RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

ORIGIN SRCID		DIST (M)	DIR (DEG)	CONC	ORIGIN SRCID		DIST (M)	DIR (DEG)	CONC
ORIGIN	:	75.00	10.00	74.22683	ORIGIN	:	100.00	10.00	58.43469
ORIGIN	:	75.00	20.00	102.32524	ORIGIN	:	100.00	20.00	82.29984
ORIGIN	:	75.00	30.00	149.31950	ORIGIN	:	100.00	30.00	118.73566
ORIGIN	:	75.00	40.00	235.64487	ORIGIN	:	100.00	40.00	157.59747
ORIGIN	:	75.00	50.00	373.65790	ORIGIN	:	100.00	50.00	234.23001
ORIGIN	:	75.00	60.00	625.57318	ORIGIN	:	100.00	60.00	392.25391
ORIGIN	:	75.00	70.00	1378.09338	ORIGIN	:	100.00	70.00	511.97284
ORIGIN	:	75.00	80.00	2709.14697	ORIGIN	:	100.00	80.00	493.78479
ORIGIN	:	100.00	90.00	401.81036	ORIGIN	:	100.00	100.00	286.18198
ORIGIN	:	100.00	110.00	282.25366	ORIGIN	:	100.00	120.00	173.55707
ORIGIN	:	100.00	130.00	134.46652	ORIGIN	:	100.00	140.00	121.28793
ORIGIN	:	100.00	150.00	107.84476	ORIGIN	:	100.00	160.00	85.77616
ORIGIN	:	100.00	210.00	20.21102	ORIGIN	:	100.00	220.00	17.64271
ORIGIN	:	100.00	230.00	15.30982	ORIGIN	:	100.00	240.00	12.98699
ORIGIN	:	100.00	310.00	17.23757	ORIGIN	:	100.00	340.00	32.40301
ORIGIN	:	75.00	350.00	52.19114	ORIGIN	:	100.00	350.00	35.86654
ORIGIN	:	75.00	360.00	59.89236	ORIGIN	:	100.00	360.00	43.47250

400321

*** ISCST3 - VERSION 00101 *** *** 1990 Carlstadt, Vinyl Chloride Impacts from Excavation Site *** 04/17/01
*** Newark/Atlantic City Meteorology, 1987 - 1991 (3/29/91) *** 08:12:27
**MODELOPTs: PAGE 14
CONC URBAN FLAT DFAULT NOCMPL

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 150.00	200.00	300.00	400.00	500.00
10.0	647.80219 (90091224)	571.77338 (90112808)	252.75580 (90112808)	131.74855 (90020908)	96.54613 (90020908)
20.0	1058.38904 (90112808)	536.58002 (90020908)	270.92557 (90020908)	142.10109 (90020908)	92.50923 (90102808)
30.0	1151.99683 (90020908)	544.63733 (90102808)	274.41840 (90101508)	164.62265c(90020108)	114.67001c(90020108)
40.0	1174.07825 (90102808)	729.04663c(90020108)	296.14368 (90050708)	153.47612 (90050708)	101.67226 (90110208)
50.0	1472.80823 (90041908)	689.35474 (90110208)	303.19229 (90092908)	172.32779 (90100708)	111.60438 (90100708)
60.0	1620.27368 (90100708)	744.10638 (90100708)	242.32944 (90120708)	140.25246 (90120708)	90.15026 (90120708)
70.0	1422.22729 (90120708)	735.71570c(90082608)	322.85635c(90082608)	170.71658c(90082608)	105.38689c(90082608)
80.0	1563.39551 (90122608)	838.25031 (90121124)	351.43631 (90121124)	192.58580 (90121124)	123.04103 (90121124)
90.0	1731.80957 (90121124)	699.26477 (90121124)	245.82741 (90091808)	133.10440 (90062524)	85.26364 (90062524)
100.0	1468.63330c(90020808)	637.27411c(90020808)	231.61646c(90020808)	122.03440c(90020808)	76.66602c(90020808)
110.0	1290.27942 (90100224)	585.00732c(90082708)	267.99060c(90082708)	148.86902c(90082708)	95.33264c(90082708)
120.0	1253.20862 (90102424)	771.46759c(90120908)	285.13882c(90120908)	139.01852c(90120908)	81.79121c(90120908)
130.0	810.04797 (90041308)	477.40222 (90041308)	202.60596 (90112008)	120.53019 (90101608)	81.36688 (90101608)
140.0	876.25543c(90030808)	388.96475c(90030808)	148.29288 (90041308)	97.57544 (90041308)	66.34615 (90041308)
150.0	960.84198 (90110908)	460.86835 (90121208)	190.88235c(90030808)	105.52575c(90030808)	62.09569c(90030808)
160.0	1180.36194c(90102108)	535.87585 (90110908)	184.50104 (90110908)	111.16213 (90121208)	72.32287 (90121208)
170.0	1535.08752c(90102108)	863.66779c(90102108)	214.55324c(90102108)	134.14304 (90110908)	91.91679 (90110908)
180.0	654.72626c(90110108)	606.04950c(90102108)	435.84250c(90102108)	248.06329c(90102108)	149.70343c(90102108)
190.0	451.91232c(90110108)	355.31824c(90110108)	192.38564 (90072208)	137.96338c(90102108)	120.29626c(90102108)
200.0	643.32629c(90020624)	321.03671c(90020624)	140.23486c(90110108)	98.34612c(90110108)	70.33874c(90110108)
210.0	489.23911c(90020624)	377.93158c(90020624)	206.42148c(90020624)	119.54240c(90020624)	75.46124c(90020624)
220.0	401.24298 (90020708)	253.98117 (90020708)	145.45384c(90020624)	104.10972c(90020624)	77.40411c(90020624)
230.0	555.84161c(90101208)	301.67831c(90101208)	144.78165c(90031408)	94.05412c(90031408)	66.89347c(90031408)
240.0	671.73181c(90101208)	448.67999c(90101208)	232.56575c(90101208)	141.09319c(90101208)	95.04855c(90101208)
250.0	424.53458c(90101208)	325.53864c(90101208)	202.97507c(90101208)	138.22388c(90101208)	100.83300c(90101208)
260.0	361.63211 (90082624)	246.58308 (90082624)	136.26727 (90082624)	87.38187 (90082624)	61.52099 (90082624)
270.0	316.30695 (90042524)	211.86398 (90042524)	116.14909 (90042524)	74.52689 (90042524)	52.52940 (90042524)
280.0	287.73889 (90042524)	187.43961 (90042524)	98.82268 (90042524)	61.78574 (90042524)	43.33948c(90061708)
290.0	273.25656c(90061708)	182.86784c(90061708)	100.23767c(90061708)	64.36680c(90061708)	45.36032c(90061708)
300.0	276.93127 (90072824)	205.27150 (90072824)	124.21713 (90072824)	83.23216 (90072824)	60.10587 (90072824)
310.0	391.64581 (90072824)	249.60135 (90072824)	124.95355 (90072224)	75.88045 (90031224)	55.43917 (90031224)
320.0	370.41678 (90031224)	259.06961 (90031224)	151.67664 (90061524)	100.10589 (90061524)	69.88116 (90061524)
330.0	465.19730 (90061524)	273.87448 (90061524)	130.30537 (90092724)	102.98362c(90031608)	83.56030c(90031608)
340.0	469.77966c(90031608)	453.44400c(90031608)	282.27023c(90031608)	162.24811c(90031608)	99.27133c(90031608)
350.0	899.83447c(90031608)	435.08279c(90031608)	159.45416 (90042508)	92.63946 (90061408)	64.14305 (90061408)
360.0	559.54633 (90042508)	324.38708 (90061408)	206.03674 (90112808)	152.43961 (90112808)	109.69417 (90112808)

400322

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 600.00	700.00	800.00	900.00	1000.00
10.0	73.29368 (90020908)	57.51110 (90020908)	46.33864 (90020908)	38.27229 (90020908)	32.23392 (90020908)
20.0	69.46334 (90102808)	53.75650 (90102808)	42.82402 (90102808)	34.92814 (90102808)	29.18569 (90102808)
30.0	83.06356c(90020108)	62.70743c(90020108)	48.87819c(90020108)	39.31266c(90020108)	32.37199c(90020108)
40.0	72.60487 (90110208)	54.33849 (90110208)	42.61718 (90092908)	35.49910 (90092908)	30.14013 (90092908)
50.0	78.12624 (90100708)	58.04501 (90100708)	44.92672 (90100708)	35.96870 (90100708)	29.61665 (90100708)
60.0	67.26933 (90101708)	52.65182 (90101708)	46.93652 (90010108)	42.85390 (90010108)	39.49971 (90010108)
70.0	84.19980 (90010108)	71.01038 (90010108)	61.34359 (90010108)	53.94388 (90010108)	48.28484 (90010108)
80.0	86.38930 (90121124)	70.60375 (90010108)	61.38551 (90010108)	54.27093 (90010108)	48.73637 (90010108)
90.0	69.58139 (90010108)	58.95409 (90010108)	51.27394 (90010108)	45.40368 (90010108)	40.79394 (90010108)
100.0	58.85465 (90010116)	50.16400 (90010116)	43.83321 (90010116)	38.93023 (90010116)	35.09565 (90010116)
110.0	66.92715c(90082708)	50.05381c(90082708)	39.21380c(90082708)	31.73940c(90082708)	26.39536c(90082708)
120.0	56.82780 (90100224)	42.48613 (90100224)	33.15054 (90100224)	26.73973 (90100224)	22.14232 (90100224)
130.0	60.11778c(90120908)	47.47829c(90120908)	38.60105c(90120908)	32.06570c(90120908)	27.19311c(90120908)
140.0	47.61867 (90041308)	35.84501 (90041308)	28.01728 (90041308)	22.82603 (90101624)	19.09450 (90101624)
150.0	39.50835c(90030808)	26.81398c(90030808)	19.34631c(90030808)	14.47259c(90030808)	11.11089c(90030808)
160.0	50.63875 (90121208)	37.48238 (90121208)	29.02798 (90121208)	23.23577 (90121208)	19.87149 (90122908)
170.0	65.49456 (90110908)	48.67918 (90110908)	37.59665 (90110908)	29.83778 (90110908)	24.32002 (90110908)
180.0	97.75866c(90102108)	68.18659c(90102108)	50.03981c(90102108)	38.22193c(90102108)	30.19335c(90102108)
190.0	100.99854c(90102108)	84.57637c(90102108)	71.47910c(90102108)	61.10216c(90102108)	52.91168c(90102108)
200.0	52.67167c(90110108)	40.93533c(90110108)	32.82717c(90110108)	26.95995c(90110108)	22.63342c(90110108)
210.0	51.17184c(90020624)	36.54173c(90020624)	27.42080c(90020624)	21.19798c(90020624)	16.90304c(90020624)
220.0	59.81216c(90020624)	47.80817c(90020624)	39.24324c(90020624)	32.97296c(90020624)	28.07645c(90020624)
230.0	50.50733c(90031408)	39.79599c(90031408)	32.48603c(90031408)	27.09464c(90031408)	23.10919c(90031408)
240.0	68.78318c(90101208)	52.27050c(90101208)	41.30753c(90101208)	33.60186c(90101208)	27.97149c(90101208)
250.0	77.25990c(90101208)	61.45874c(90101208)	50.31298c(90101208)	42.19256c(90101208)	36.01482c(90101208)
260.0	46.08640 (90082624)	36.08167 (90082624)	29.26484 (90082624)	24.31786 (90082624)	20.64604 (90082624)
270.0	39.71289 (90090908)	31.41361 (90090908)	25.64935 (90090908)	21.47063 (90090908)	18.32776 (90090908)
280.0	32.78854c(90061708)	25.87923c(90061708)	21.08530c(90061708)	17.61693c(90061708)	15.00517c(90061708)
290.0	33.96170c(90061708)	26.68407c(90061708)	21.57502c(90061708)	17.87952c(90061708)	15.18174c(90061708)
300.0	45.70879 (90072824)	36.16059 (90072824)	29.47416 (90072824)	24.62866 (90072824)	20.95912 (90072824)
310.0	42.49357 (90031224)	33.79955 (90031224)	27.58902 (90031224)	23.07611 (90031224)	19.63731 (90031224)
320.0	51.37271 (90061524)	39.43148 (90061524)	31.24887 (90061524)	25.42817 (90061524)	21.20950 (90061524)
330.0	68.60243c(90031608)	57.30906c(90031608)	48.52681c(90031608)	41.86978c(90031608)	36.32368c(90031608)
340.0	64.92757c(90031608)	45.07457c(90031608)	34.52561 (90072308)	27.67195 (90072308)	22.81022 (90072308)
350.0	46.98988 (90061408)	37.40789 (90091224)	31.08698 (90091224)	26.29688 (90091224)	22.49979 (90091224)
360.0	81.24490 (90112808)	62.21136 (90112808)	49.15868 (90112808)	39.92781 (90112808)	33.11088 (90112808)

400323

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
-51.00	96.60	682.36755	(90061524)	-30.10	83.00	1011.31604	(90061524)
-9.00	69.50	1488.34131	(90061524)	13.10	57.80	2562.07153c	(90031608)
35.50	46.80	6656.06885c	(90031608)	53.80	30.40	15234.85160	(90112808)
66.90	9.10	50962.09770	(90041908)	84.30	-8.70	13031.80180c	(90020808)
75.10	-28.30	10845.80270	(90041308)	59.70	-48.00	7960.54443c	(90102108)
44.20	-67.70	6630.92578c	(90102108)	28.80	-87.40	2046.43640	(90072208)
13.40	-107.00	1229.52393c	(90110108)	-2.00	-126.70	809.56830c	(90110108)
-19.60	-111.20	963.88971c	(90020624)	-37.30	-93.60	894.47009c	(90020624)
-54.90	-75.90	777.81622c	(90101208)	-60.20	-58.00	1422.89270c	(90101208)
-78.50	-40.90	995.17236c	(90101208)	-96.10	-39.00	642.02386c	(90101208)
-113.90	-21.50	496.62854	(90082624)	-126.50	-2.00	382.20288	(90042524)
-111.90	18.00	441.60910	(90042524)	-96.60	37.80	440.28455c	(90061708)
-81.30	57.60	514.09436	(90072824)	-65.90	77.30	629.09369	(90072824)

400324

*** THE   1ST HIGHEST 8-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL   ***
INCLUDING SOURCE(S):   ORIGIN   , SRC1   ,

*** DISCRETE POLAR RECEPTOR POINTS ***

** CONC OF OTHER   IN (MICROGRAMS/CUBIC-METER)   **

ORIGIN SRCID		DIST (M)	DIR (DEG)	CONC	(YYMMDDHH)	ORIGIN SRCID		DIST (M)	DIR (DEG)	CONC	(YYMMDDHH)
ORIGIN	:	75.00	10.00	3035.55469c	(90031608)	ORIGIN	:	100.00	10.00	1317.60803	(90072308)
ORIGIN	:	75.00	20.00	2836.75391c	(90031608)	ORIGIN	:	100.00	20.00	1365.46155	(90091224)
ORIGIN	:	75.00	30.00	2508.62036	(90061408)	ORIGIN	:	100.00	30.00	2657.77271	(90112808)
ORIGIN	:	75.00	40.00	4494.51270	(90112808)	ORIGIN	:	100.00	40.00	2917.16919	(90020908)
ORIGIN	:	75.00	50.00	7522.75488	(90112808)	ORIGIN	:	100.00	50.00	3439.27856	(90102808)
ORIGIN	:	75.00	60.00	10886.28910	(90020908)	ORIGIN	:	100.00	60.00	4858.19385	(90041908)
ORIGIN	:	75.00	70.00	15196.36520	(90101508)	ORIGIN	:	100.00	70.00	6039.77295	(90100708)
ORIGIN	:	75.00	80.00	23504.41410	(90041908)	ORIGIN	:	100.00	80.00	6239.73535c	(90082608)
ORIGIN	:	100.00	90.00	8769.38281	(90121124)	ORIGIN	:	100.00	100.00	5842.05664c	(90020808)
ORIGIN	:	100.00	110.00	6631.03662c	(90120908)	ORIGIN	:	100.00	120.00	3011.24951	(90041308)
ORIGIN	:	100.00	130.00	3094.15356	(90121208)	ORIGIN	:	100.00	140.00	3103.48608	(90110908)
ORIGIN	:	100.00	150.00	4184.66748c	(90102108)	ORIGIN	:	100.00	160.00	2937.87524c	(90102108)
ORIGIN	:	100.00	210.00	733.27655	(90020708)	ORIGIN	:	100.00	220.00	827.27411c	(90101208)
ORIGIN	:	100.00	230.00	1142.27563c	(90101208)	ORIGIN	:	100.00	240.00	1027.35315c	(90101208)
ORIGIN	:	100.00	310.00	619.35138	(90072824)	ORIGIN	:	100.00	340.00	858.48724	(90061524)
ORIGIN	:	75.00	350.00	1332.23572	(90061524)	ORIGIN	:	100.00	350.00	976.89063c	(90031608)
ORIGIN	:	75.00	360.00	1581.48352c	(90031608)	ORIGIN	:	100.00	360.00	1821.98340c	(90031608)

400325

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE SUMMARY OF MAXIMUM PERIOD (8760 HRS) RESULTS ***

** CONC OF OTHER   IN (MICROGRAMS/CUBIC-METER)   **

GROUP ID		AVERAGE CONC		RECEPTOR (XR,	YR,	ZELEV,	ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	1ST HIGHEST VALUE IS	6524.39893	AT (	66.90,	9.10,	0.00,	0.00)	DC	NA
	2ND HIGHEST VALUE IS	2709.14697	AT (	73.86,	13.02,	0.00,	0.00)	DP	NA
	3RD HIGHEST VALUE IS	1378.09338	AT (	70.48,	25.65,	0.00,	0.00)	DP	NA
	4TH HIGHEST VALUE IS	847.77698	AT (	84.30,	-8.70,	0.00,	0.00)	DC	NA
	5TH HIGHEST VALUE IS	803.63043	AT (	53.80,	30.40,	0.00,	0.00)	DC	NA
	6TH HIGHEST VALUE IS	646.58551	AT (	75.10,	-28.30,	0.00,	0.00)	DC	NA
	7TH HIGHEST VALUE IS	625.57318	AT (	64.95,	37.50,	0.00,	0.00)	DP	NA
	8TH HIGHEST VALUE IS	511.97284	AT (	93.97,	34.20,	0.00,	0.00)	DP	NA
	9TH HIGHEST VALUE IS	493.78479	AT (	98.48,	17.36,	0.00,	0.00)	DP	NA
	10TH HIGHEST VALUE IS	401.81036	AT (	100.00,	0.00,	0.00,	0.00)	DP	NA

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

400326

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF OTHER   IN (MICROGRAMS/CUBIC-METER)   **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	50962.09770	ON 90041908: AT	(66.90, 9.10, 0.00, 0.00)	DC	NA

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

400327

```
*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of         236 Informational Message(s)

A Total of         236 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
SO W320    17 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

400328

1991 METEOROLOGICAL DATA

```
CO STARTING
CO TITLEONE 1991 Carlstadt, Vinyl Chloride Impacts from Excavation Site
CO TITLETWO Newark/Atlantic City Meteorology, 1987 - 1991 (3/29/91)
CO MODELOPT DFAULT CONC   URBAN  NOCMPL
CO AVERTIME PERIOD 8
CO POLLUTID OTHER
CO DCAYCOEF    .000000
CO RUNORNOT RUN
CO FINISHED

SO STARTING
** Source Location Cards:
**         SRCID SRCTYP      XS     YS      ZS
**                          (m)    (m)     (m)
** SOURCE ORIGIN ONLY USED FOR RECEPTOR PLACEMENT
SO LOCATION ORIGIN POINT     0.0    0.0     0.0
SO SRCPARAM ORIGIN 0.0  10  300 10.0 3.0

** SOURCE ORIGIN FOR AREAPOLY
**         SRCID SRCTYP      XS     YS      ZS
**                          (m)    (m)     (m)
SO LOCATION SRC1  AREAPOLY   56.05  0.0     0.0

** Source Parameter Cards:
** AREAPOLY SOURCE
**                  Q          RH     NoVert.   Sz(optional)
**     SRCID     (g/s/m2)     (m)     (#)       (m)
SO SRCPARAM SRC1  0.017521    0.00    5
SO AREAVERT SRC1   56.05  0.00   54.12  6.69   61.11  4.31
SO AREAVERT SRC1   65.72 -8.92   59.62 -14.12
SO EMISUNIT    .100000E+07 (GRAMS/SEC)          (MICROGRAMS/CUBIC-METER)
SO SRCGROUP ALL
SO FINISHED

RE STARTING
RE GRIDPOLR POL STA
RE GRIDPOLR POL ORIG  0.0   0.0
RE GRIDPOLR POL DIST  150 200 300 400 500 600 700 800 900 1000
RE GRIDPOLR POL GDIR  36  10.00  10.00
RE GRIDPOLR POL END
**  FENCELINE RECEPTORS AT  25-M INTERVALS
RE DISCCART      -51.0      96.6
RE DISCCART      -30.1      83.0
RE DISCCART       -9.0      69.5
RE DISCCART       13.1      57.8
RE DISCCART       35.5      46.8
RE DISCCART       53.8      30.4
RE DISCCART       66.9       9.1
RE DISCCART       84.3      -8.7
RE DISCCART       75.1     -28.3
RE DISCCART       59.7     -48.0
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RE DISCCART       44.2      -67.7
RE DISCCART       28.8      -87.4
RE DISCCART       13.4     -107.0
RE DISCCART       -2.0     -126.7
RE DISCCART      -19.6     -111.2
RE DISCCART      -37.3      -93.6
RE DISCCART      -54.9      -75.9
RE DISCCART      -60.2      -58.0
RE DISCCART      -78.5      -40.9
RE DISCCART      -96.1      -39.0
RE DISCCART     -113.9      -21.5
RE DISCCART     -126.5       -2.0
RE DISCCART     -111.9       18.0
RE DISCCART      -96.6       37.8
RE DISCCART      -81.3       57.6
RE DISCCART      -65.9       77.3
RE DISCPOLR ORIGIN        75.          10
RE DISCPOLR ORIGIN       100.          10
RE DISCPOLR ORIGIN        75.          20
RE DISCPOLR ORIGIN       100.          20
RE DISCPOLR ORIGIN        75.          30
RE DISCPOLR ORIGIN       100.          30
RE DISCPOLR ORIGIN        75.          40
RE DISCPOLR ORIGIN       100.          40
RE DISCPOLR ORIGIN        75.          50
RE DISCPOLR ORIGIN       100.          50
RE DISCPOLR ORIGIN        75.          60
RE DISCPOLR ORIGIN       100.          60
RE DISCPOLR ORIGIN        75.          70
RE DISCPOLR ORIGIN       100.          70
RE DISCPOLR ORIGIN        75.          80
RE DISCPOLR ORIGIN       100.          80
RE DISCPOLR ORIGIN       100.          90
RE DISCPOLR ORIGIN       100.         100
RE DISCPOLR ORIGIN       100.         110
RE DISCPOLR ORIGIN       100.         120
RE DISCPOLR ORIGIN       100.         130
RE DISCPOLR ORIGIN       100.         140
RE DISCPOLR ORIGIN       100.         150
RE DISCPOLR ORIGIN       100.         160
RE DISCPOLR ORIGIN       100.         210
RE DISCPOLR ORIGIN       100.         220
RE DISCPOLR ORIGIN       100.         230
RE DISCPOLR ORIGIN       100.         240
RE DISCPOLR ORIGIN       100.         310
RE DISCPOLR ORIGIN       100.         340
RE DISCPOLR ORIGIN        75.         350
RE DISCPOLR ORIGIN       100.         350
RE DISCPOLR ORIGIN        75.         360
RE DISCPOLR ORIGIN       100.         360
RE FINISHED
```

```
ME STARTING
ME INPUTFIL EWKACY91.MET
ME ANEMHGHT  20 FEET
ME SURFDATA  14734     1991       NEWARK
ME UAIRDATA  93755     1991       ATLANTIC_CITY
ME WINDCATS    1.54     3.09    5.14    8.23   10.80
ME FINISHED

OU STARTING
OU RECTABLE ALLAVE FIRST
OU PLOTFILE 8 ALL FIRST 08.P91
OU FINISHED

 *** Message Summary For ISC3 Model Setup ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           1 Warning Message(s)
A Total of           0 Informational Message(s)

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
SO W320    17 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

***********************************
*** SETUP Finishes Successfully ***
***********************************
```

400332

*** MODEL SETUP OPTIONS SUMMARY ***

- -

**Simple Terrain Model is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

-- SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION. DDPLETE = F
**Model Uses NO WET DEPLETION. WDPLETE = F
**NO WET SCAVENGING Data Provided.
**NO GAS DRY DEPOSITION Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
1. Final Plume Rise.
2. Stack-tip Downwash.
3. Buoyancy-induced Dispersion.
4. Use Calms Processing Routine.
5. Not Use Missing Data Processing Routine.
6. Default Wind Profile Exponents.
7. Default Vertical Potential Temperature Gradients.
8. "Upper Bound" Values for Supersquat Buildings.
9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates 1 Short Term Average(s) of: 8-HR
and Calculates PERIOD Averages

**This Run Includes: 2 Source(s);   1 Source Group(s); and   420 Receptor(s)

**The Model Assumes A Pollutant Type of: OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
Model Outputs Tables of PERIOD Averages by Receptor
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours

```
                                                     b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =     6.10 ;    Decay Coef. =    0.000     ;    Rot. Angle =     0.0
                 Emission Units = (GRAMS/SEC)                              ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = (MICROGRAMS/CUBIC-METER)

**Approximate Storage Requirements of Model =     1.2 MB of RAM.

**Input Runstream File:          vinyl.i91
**Output Print File:             vinyl.o91
```

400334

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BUILDING EXISTS	EMISSION RATE SCALAR VARY BY
ORIGIN	0	0.00000E+00	0.0	0.0	0.0	10.00	300.00	10.00	3.00	NO	

400335

*** AREAPOLY SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS /METER**2)	LOCATION OF AREA X (METERS)	LOCATION OF AREA Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	NUMBER OF VERTS.	INIT. SZ (METERS)	EMISSION RATE SCALAR VARY BY
SRC1	0	0.17521E-01	56.0	0.0	0.0	0.00	5	0.00	

400336

*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID   SOURCE IDs

ALL   ORIGIN , SRC1 ,

400337

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** GRIDDED RECEPTOR NETWORK SUMMARY ***

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

*** ORIGIN FOR POLAR NETWORK ***
X-ORIG = 0.00 ; Y-ORIG = 0.00 (METERS)

*** DISTANCE RANGES OF NETWORK ***
(METERS)

150.0,	200.0,	300.0,	400.0,	500.0,	600.0,	700.0,	800.0,	900.0,	1000.0,

*** DIRECTION RADIALS OF NETWORK ***
(DEGREES)

10.0,	20.0,	30.0,	40.0,	50.0,	60.0,	70.0,	80.0,	90.0,	100.0,
110.0,	120.0,	130.0,	140.0,	150.0,	160.0,	170.0,	180.0,	190.0,	200.0,
210.0,	220.0,	230.0,	240.0,	250.0,	260.0,	270.0,	280.0,	290.0,	300.0,
310.0,	320.0,	330.0,	340.0,	350.0,	360.0,				

400338

**MODELOPTs:
CONC   URBAN   FLAT   DFAULT   NOCMPL

*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZFLAG)
(METERS)

```
(    -51.0,     96.6,      0.0,      0.0);       (    -30.1,     83.0,      0.0,      0.0);
(     -9.0,     69.5,      0.0,      0.0);       (     13.1,     57.8,      0.0,      0.0);
(     35.5,     46.8,      0.0,      0.0);       (     53.8,     30.4,      0.0,      0.0);
(     66.9,      9.1,      0.0,      0.0);       (     84.3,     -8.7,      0.0,      0.0);
(     75.1,    -28.3,      0.0,      0.0);       (     59.7,    -48.0,      0.0,      0.0);
(     44.2,    -67.7,      0.0,      0.0);       (     28.8,    -87.4,      0.0,      0.0);
(     13.4,   -107.0,      0.0,      0.0);       (     -2.0,   -126.7,      0.0,      0.0);
(    -19.6,   -111.2,      0.0,      0.0);       (    -37.3,    -93.6,      0.0,      0.0);
(    -54.9,    -75.9,      0.0,      0.0);       (    -60.2,    -58.0,      0.0,      0.0);
(    -78.5,    -40.9,      0.0,      0.0);       (    -96.1,    -39.0,      0.0,      0.0);
(   -113.9,    -21.5,      0.0,      0.0);       (   -126.5,     -2.0,      0.0,      0.0);
(   -111.9,     18.0,      0.0,      0.0);       (    -96.6,     37.8,      0.0,      0.0);
(    -81.3,     57.6,      0.0,      0.0);       (    -65.9,     77.3,      0.0,      0.0);
```

400339

*** DISCRETE POLAR RECEPTORS ***
ORIGIN: (DIST, DIR, ZELEV, ZFLAG)
SRCID: (METERS,DEG,METERS,METERS)

ORIGIN	: (	75.0,	10.0,	0.0,	0.0);		ORIGIN	: (	100.0,	10.0,	0.0,	0.0);
ORIGIN	: (	75.0,	20.0,	0.0,	0.0);		ORIGIN	: (	100.0,	20.0,	0.0,	0.0);
ORIGIN	: (	75.0,	30.0,	0.0,	0.0);		ORIGIN	: (	100.0,	30.0,	0.0,	0.0);
ORIGIN	: (	75.0,	40.0,	0.0,	0.0);		ORIGIN	: (	100.0,	40.0,	0.0,	0.0);
ORIGIN	: (	75.0,	50.0,	0.0,	0.0);		ORIGIN	: (	100.0,	50.0,	0.0,	0.0);
ORIGIN	: (	75.0,	60.0,	0.0,	0.0);		ORIGIN	: (	100.0,	60.0,	0.0,	0.0);
ORIGIN	: (	75.0,	70.0,	0.0,	0.0);		ORIGIN	: (	100.0,	70.0,	0.0,	0.0);
ORIGIN	: (	75.0,	80.0,	0.0,	0.0);		ORIGIN	: (	100.0,	80.0,	0.0,	0.0);
ORIGIN	: (	100.0,	90.0,	0.0,	0.0);		ORIGIN	: (	100.0,	100.0,	0.0,	0.0);
ORIGIN	: (	100.0,	110.0,	0.0,	0.0);		ORIGIN	: (	100.0,	120.0,	0.0,	0.0);
ORIGIN	: (	100.0,	130.0,	0.0,	0.0);		ORIGIN	: (	100.0,	140.0,	0.0,	0.0);
ORIGIN	: (	100.0,	150.0,	0.0,	0.0);		ORIGIN	: (	100.0,	160.0,	0.0,	0.0);
ORIGIN	: (	100.0,	210.0,	0.0,	0.0);		ORIGIN	: (	100.0,	220.0,	0.0,	0.0);
ORIGIN	: (	100.0,	230.0,	0.0,	0.0);		ORIGIN	: (	100.0,	240.0,	0.0,	0.0);
ORIGIN	: (	100.0,	310.0,	0.0,	0.0);		ORIGIN	: (	100.0,	340.0,	0.0,	0.0);
ORIGIN	: (	75.0,	350.0,	0.0,	0.0);		ORIGIN	: (	100.0,	350.0,	0.0,	0.0);
ORIGIN	: (	75.0,	360.0,	0.0,	0.0);		ORIGIN	: (	100.0,	360.0,	0.0,	0.0);

**MODELOPTs:
CONC   URBAN   FLAT   DFAULT   NOCMPL

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
B	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
C	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00	.20000E+00
D	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00	.25000E+00
E	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00
F	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00	.30000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY	WIND SPEED CATEGORY					
CATEGORY	1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01

400341

F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

**MODELOPTs:
CONC URBAN FLAT DFAULT NOCMPL

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: EWKACY91.MET
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.: 14734 UPPER AIR STATION NO.: 93755
NAME: NEWARK NAME: ATLANTIC_CITY
YEAR: 1991 YEAR: 1991

YR	MN	DY	HR	FLOW VECTOR	SPEED (M/S)	TEMP (K)	STAB CLASS	MIXING HEIGHT (M) RURAL	MIXING HEIGHT (M) URBAN	USTAR (M/S)	M-O LENGTH (M)	Z-0 (M)	IPCODE	PRATE (mm/HR)
91	01	01	01	161.0	2.57	269.8	6	1045.0	47.0	0.0000	0.0	0.0000	0	0.00
91	01	01	02	158.0	1.54	269.8	7	1055.3	47.0	0.0000	0.0	0.0000	0	0.00
91	01	01	03	164.0	0.00	269.3	7	1065.6	47.0	0.0000	0.0	0.0000	0	0.00
91	01	01	04	223.0	1.54	269.8	7	1075.9	47.0	0.0000	0.0	0.0000	0	0.00
91	01	01	05	223.0	0.00	269.3	7	1086.2	47.0	0.0000	0.0	0.0000	0	0.00
91	01	01	06	222.0	0.00	268.7	7	1096.5	47.0	0.0000	0.0	0.0000	0	0.00
91	01	01	07	225.0	0.00	268.7	7	1106.8	47.0	0.0000	0.0	0.0000	0	0.00
91	01	01	08	163.0	1.54	269.8	6	101.6	144.5	0.0000	0.0	0.0000	0	0.00
91	01	01	09	157.0	2.06	271.5	5	281.2	317.0	0.0000	0.0	0.0000	0	0.00
91	01	01	10	171.0	1.54	273.1	4	460.7	489.4	0.0000	0.0	0.0000	0	0.00
91	01	01	11	354.0	1.54	274.8	3	640.3	661.8	0.0000	0.0	0.0000	0	0.00
91	01	01	12	46.0	1.54	274.8	2	819.9	834.2	0.0000	0.0	0.0000	0	0.00
91	01	01	13	13.0	3.09	276.5	3	999.4	1006.6	0.0000	0.0	0.0000	0	0.00
91	01	01	14	359.0	3.09	276.5	3	1179.0	1179.0	0.0000	0.0	0.0000	0	0.00
91	01	01	15	322.0	3.09	276.5	4	1179.0	1179.0	0.0000	0.0	0.0000	0	0.00
91	01	01	16	324.0	2.57	275.9	4	1179.0	1179.0	0.0000	0.0	0.0000	0	0.00
91	01	01	17	321.0	2.57	275.9	5	1162.1	1120.7	0.0000	0.0	0.0000	0	0.00
91	01	01	18	347.0	2.06	275.4	6	1122.9	985.7	0.0000	0.0	0.0000	0	0.00
91	01	01	19	4.0	2.06	274.8	6	1083.7	850.8	0.0000	0.0	0.0000	0	0.00
91	01	01	20	357.0	2.06	274.8	6	1044.5	715.8	0.0000	0.0	0.0000	0	0.00
91	01	01	21	360.0	1.54	274.3	7	1005.3	580.9	0.0000	0.0	0.0000	0	0.00
91	01	01	22	22.0	2.06	274.3	6	966.1	445.9	0.0000	0.0	0.0000	0	0.00
91	01	01	23	60.0	2.57	274.8	5	926.9	311.0	0.0000	0.0	0.0000	0	0.00
91	01	01	24	60.0	0.00	273.7	6	887.7	176.0	0.0000	0.0	0.0000	0	0.00

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

400343

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 150.00	200.00	300.00	400.00	500.00	600.00	700.00	800.00	900.00
10.00	24.48110	16.18633	8.34175	4.91082	3.20543	2.25836	1.68303	1.30747	1.04900
20.00	32.78300	19.16787	7.94911	4.47754	2.97711	2.16658	1.66819	1.33420	1.09865
30.00	35.80937	19.24680	10.00926	6.31237	4.35605	3.20132	2.46461	1.96522	1.61031
40.00	44.85247	29.90626	15.15944	9.09869	6.10167	4.40380	3.34712	2.64442	2.15157
50.00	77.01269	46.20697	20.95454	11.89434	7.71967	5.45533	4.08786	3.19470	2.57840
60.00	121.25163	62.68163	24.56043	12.93634	8.02154	5.49673	4.02609	3.09439	2.46286
70.00	146.05562	60.77239	20.31606	10.14524	6.13094	4.13820	3.00005	2.28768	1.80992
80.00	109.95155	43.55632	14.71755	7.45817	4.55291	3.09429	2.25439	1.72464	1.36898
90.00	87.04118	36.52240	12.86629	6.63265	4.09077	2.80024	2.05270	1.57832	1.25782
100.00	70.22692	29.81811	10.62529	5.49967	3.39538	2.32376	1.70145	1.30637	1.03903
110.00	77.73446	31.64076	10.84826	5.52605	3.38258	2.30209	1.67922	1.28572	1.02069
120.00	72.12498	35.21171	13.05405	6.72667	4.12441	2.80574	2.04430	1.56421	1.24051
130.00	49.05259	25.95349	11.22999	6.29590	4.05379	2.84785	2.12261	1.65181	1.32767
140.00	36.16083	20.33528	8.69552	4.86505	3.14773	2.22341	1.66620	1.30174	1.04939
150.00	30.13546	15.77553	7.18889	4.17058	2.73196	1.93678	1.44957	1.13173	0.91094
160.00	32.46913	15.58214	6.28740	3.49047	2.25797	1.59717	1.19780	0.93822	0.75660
170.00	37.60084	18.57817	7.11190	3.78945	2.38231	1.64895	1.21724	0.93932	0.75030
180.00	37.35960	21.59813	9.07562	4.88108	3.05117	2.09884	1.53950	1.18246	0.94016
190.00	32.69418	20.61945	10.12768	5.92725	3.88163	2.74483	2.05077	1.59611	1.28263
200.00	28.12392	18.38418	9.47898	5.79670	3.93679	2.86486	2.19127	1.73796	1.41827
210.00	22.86763	15.83448	8.66327	5.45181	3.76704	2.77704	2.14398	1.71464	1.40930
220.00	17.16738	12.35755	7.21594	4.75156	3.39482	2.56905	2.02786	1.65280	1.38013
230.00	12.48800	8.93277	5.29348	3.55036	2.57832	1.97676	1.57838	1.29841	1.09428
240.00	9.49100	6.68910	3.86395	2.55013	1.83039	1.39119	1.10252	0.90141	0.75454
250.00	7.00297	4.95243	2.90517	1.94578	1.41545	1.08903	0.87233	0.72116	0.61003
260.00	5.20961	3.57862	2.03243	1.33874	0.96387	0.73649	0.58726	0.48280	0.40673
270.00	4.06431	2.72074	1.48711	0.95078	0.66780	0.49929	0.39024	0.31501	0.26107
280.00	3.33685	2.18383	1.15394	0.71820	0.49285	0.36129	0.27752	0.22078	0.18059
290.00	3.55790	2.40306	1.32407	0.84635	0.59172	0.43963	0.34128	0.27411	0.22583
300.00	5.16646	3.72800	2.22159	1.48645	1.07238	0.81590	0.64560	0.52668	0.43999
310.00	8.39070	6.12242	3.61845	2.39060	1.70756	1.28939	1.01496	0.82451	0.68662
320.00	12.00931	8.39556	4.68674	2.98966	2.08471	1.54725	1.20074	0.96495	0.79613
330.00	14.87014	9.77268	4.97402	2.99201	2.00703	1.44932	1.10373	0.87315	0.71005
340.00	15.92041	9.69123	4.81152	2.95638	2.03177	1.49561	1.15400	0.92277	0.75879
350.00	16.36837	10.48541	5.50133	3.41728	2.34865	1.72543	1.32932	1.06138	0.87144
360.00	19.39443	12.61268	6.65419	4.16927	2.88494	2.12946	1.64713	1.31840	1.08253

400344

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 1000.00
10.00	0.86368
20.00	0.92513
30.00	1.34869
40.00	1.79121
50.00	2.13340
60.00	2.01513
70.00	1.47363
80.00	1.11651
90.00	1.03027
100.00	0.84946
110.00	0.83296
120.00	1.01171
130.00	1.09497
140.00	0.86809
150.00	0.75177
160.00	0.62649
170.00	0.61470
180.00	0.76814
190.00	1.05628
200.00	1.18325
210.00	1.18321
220.00	1.17708
230.00	0.94060
240.00	0.64440
250.00	0.52616
260.00	0.34927
270.00	0.22088
280.00	0.15104
290.00	0.19007
300.00	0.37456
310.00	0.58333
320.00	0.67183
330.00	0.59253
340.00	0.63668
350.00	0.72877
360.00	0.90880

CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
-51.00	96.60	22.74680	-30.10	83.00	33.11884
-9.00	69.50	51.99099	13.10	57.80	86.24576
35.50	46.80	158.65445	53.80	30.40	532.31885
66.90	9.10	5717.21631	84.30	-8.70	1008.90204
75.10	-28.30	733.36005	59.70	-48.00	288.88538
44.20	-67.70	186.95715	28.80	-87.40	112.49702
13.40	-107.00	71.38004	-2.00	-126.70	48.62177
-19.60	-111.20	48.95056	-37.30	-93.60	42.70087
-54.90	-75.90	29.73742	-60.20	-58.00	24.20441
-78.50	-40.90	14.95215	-96.10	-39.00	11.06344
-113.90	-21.50	7.23605	-126.50	-2.00	5.19255
-111.90	18.00	4.94559	-96.60	37.80	5.77654
-81.30	57.60	9.62763	-65.90	77.30	17.20106

400346

*** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE POLAR RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC	ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC
ORIGIN :	75.00	10.00	59.57119	ORIGIN :	100.00	10.00	41.79700
ORIGIN :	75.00	20.00	74.78426	ORIGIN :	100.00	20.00	55.08010
ORIGIN :	75.00	30.00	102.94594	ORIGIN :	100.00	30.00	78.59875
ORIGIN :	75.00	40.00	154.67497	ORIGIN :	100.00	40.00	103.52627
ORIGIN :	75.00	50.00	251.91313	ORIGIN :	100.00	50.00	130.20009
ORIGIN :	75.00	60.00	378.06754	ORIGIN :	100.00	60.00	260.71512
ORIGIN :	75.00	70.00	862.19305	ORIGIN :	100.00	70.00	509.98785
ORIGIN :	75.00	80.00	2637.21118	ORIGIN :	100.00	80.00	620.74976
ORIGIN :	100.00	90.00	446.53497	ORIGIN :	100.00	100.00	352.17603
ORIGIN :	100.00	110.00	352.81540	ORIGIN :	100.00	120.00	197.70679
ORIGIN :	100.00	130.00	120.41386	ORIGIN :	100.00	140.00	95.55180
ORIGIN :	100.00	150.00	96.26260	ORIGIN :	100.00	160.00	96.82519
ORIGIN :	100.00	210.00	33.96053	ORIGIN :	100.00	220.00	24.93968
ORIGIN :	100.00	230.00	18.80433	ORIGIN :	100.00	240.00	14.41085
ORIGIN :	100.00	310.00	11.82487	ORIGIN :	100.00	340.00	28.84135
ORIGIN :	75.00	350.00	46.46922	ORIGIN :	100.00	350.00	31.60918
ORIGIN :	75.00	360.00	52.76497	ORIGIN :	100.00	360.00	34.13372

400347

*** ISCST3 - VERSION 00101 *** *** 1991 Carlstadt, Vinyl Chloride Impacts from Excavation Site *** 04/17/01
*** Newark/Atlantic City Meteorology, 1987 - 1991 (3/29/91) *** 08:15:58
**MODELOPTs: PAGE 14
CONC URBAN FLAT DFAULT NOCMPL

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 150.00	200.00	300.00	400.00	500.00
10.0	570.01349c(91072824)	355.61157c(91102624)	283.63153 (91101508)	175.53908 (91101508)	114.46101c(91020208)
20.0	971.58038 (91101508)	633.62549 (91101508)	282.49625c(91020208)	137.02177c(91020208)	80.30312c(91020208)
30.0	1267.39050c(91020208)	520.71002c(91020208)	253.49255c(91012824)	148.37831 (91020508)	96.31870 (91111824)
40.0	1105.22327c(91012824)	623.31500 (91020508)	363.37296 (91010508)	255.19086 (91010508)	175.43369 (91010508)
50.0	1657.93884 (91010508)	1183.65820 (91010508)	366.93066 (91010508)	170.80627 (91100908)	110.07724c(91060708)
60.0	1890.98242 (91010508)	860.93311c(91060708)	328.93079 (91121108)	176.02798 (91082708)	108.92370c(91080108)
70.0	1814.75476c(91080108)	796.95166c(91080108)	291.19363 (91082908)	166.96071 (91082908)	108.13110 (91082908)
80.0	1509.85596 (91082908)	794.71631c(91092308)	309.38010c(91092308)	162.35883c(91092308)	100.98721c(91092308)
90.0	1613.56165c(91042508)	708.25690c(91042508)	258.52359c(91042508)	136.71339c(91042508)	86.26032c(91042508)
100.0	1287.56873c(91072008)	644.04858c(91072008)	258.22235c(91072008)	141.49193c(91072008)	90.88381c(91072008)
110.0	1395.24133c(91060608)	611.39233 (91092808)	233.03912 (91092808)	124.10968 (91112708)	81.21436 (91112708)
120.0	1196.03442c(91060608)	968.26416c(91060608)	384.71832c(91060608)	185.92587c(91060608)	107.33800c(91060608)
130.0	1352.34583c(91031308)	805.88037c(91031308)	231.49687c(91031308)	102.71989 (91032608)	81.28553c(91060608)
140.0	1537.23376c(91010108)	603.91571c(91010108)	250.20703c(91031308)	166.66695c(91031308)	113.02776c(91031308)
150.0	641.76910 (91053024)	480.41260c(91010108)	328.83783c(91010108)	170.87691c(91010108)	96.62170c(91010108)
160.0	776.06781c(91010308)	415.23450c(91010308)	136.26146 (91070908)	91.08852 (91102024)	76.21520c(91010108)
170.0	1034.89392c(91042608)	400.28320 (91060308)	205.11986c(91010308)	113.60267c(91010308)	67.34945c(91010308)
180.0	821.60168 (91092208)	556.08203c(91042608)	252.44461c(91042608)	111.18954c(91042608)	72.04678 (91060308)
190.0	805.91217c(91110608)	538.44244c(91110608)	225.70758 (91092208)	146.92154c(91042608)	109.31721c(91042608)
200.0	943.01868 (91020616)	537.99933 (91020616)	249.91048c(91110608)	162.91180c(91110608)	110.84377c(91110608)
210.0	1080.97253 (91020616)	845.57880 (91020616)	513.52307 (91020616)	342.50812 (91020616)	246.98915 (91020616)
220.0	752.22400 (91020616)	720.51855 (91020616)	581.60748 (91020616)	466.37338 (91020616)	383.76578 (91020616)
230.0	341.06375c(91032808)	350.41406 (91020616)	332.64172 (91020616)	297.43256 (91020616)	264.51120 (91020616)
240.0	611.44232 (91020624)	435.35089 (91020624)	258.30627 (91020624)	176.59683 (91020624)	131.40387 (91020624)
250.0	631.98907 (91020624)	518.81091 (91020624)	379.04840 (91020624)	298.74292 (91020624)	247.09808 (91020624)
260.0	385.72043 (91020624)	327.31961 (91020624)	252.02182 (91020624)	205.94835 (91020624)	174.09921 (91020624)
270.0	236.91241 (91050424)	161.31345 (91050424)	90.40259 (91050424)	61.93114 (91020624)	50.20617 (91020624)
280.0	221.49283 (91043024)	147.30228 (91043024)	79.73627 (91043024)	50.67951 (91043024)	35.43571 (91043024)
290.0	166.56615 (91042008)	119.71597c(91041224)	73.58458c(91031708)	49.99948c(91031708)	36.55095c(91031708)
300.0	205.78752c(91031708)	126.21216 (91070408)	84.61206 (91070408)	60.31868 (91070408)	45.38999 (91070408)
310.0	359.21033 (91070408)	264.75101 (91070408)	157.08409 (91042408)	106.87984 (91042408)	77.92104 (91042408)
320.0	512.47473 (91042408)	346.34366 (91042408)	175.65005 (91042408)	104.08221 (91042408)	74.62623c(91100508)
330.0	485.40411 (91042408)	394.02533c(91100508)	215.07838c(91100508)	120.85723c(91100508)	74.73771c(91100508)
340.0	638.26355c(91100508)	291.14276c(91100508)	111.32971 (91031324)	77.44954 (91090824)	58.59175 (91032924)
350.0	358.55032 (91082924)	290.18808c(91072824)	202.79669c(91072824)	126.65613c(91072824)	82.53760c(91072824)
360.0	674.80182c(91072824)	415.29211c(91072824)	139.00647 (91051024)	87.41230c(91102624)	70.43220c(91102624)

400348

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** NETWORK ID: POL ; NETWORK TYPE: GRIDPOLR ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

DIRECTION (DEGREES)	DISTANCE (METERS) 600.00	700.00	800.00	900.00	1000.00
10.0	86.54408c(91020208)	66.92610c(91020208)	53.15272c(91020208)	43.24199c(91020208)	35.89817c(91020208)
20.0	55.23759c(91012824)	44.19055c(91012824)	37.42323 (91032916)	33.54729 (91032916)	30.56189 (91032916)
30.0	68.13042 (91111824)	50.50221 (91111824)	39.29127c(91101908)	33.81342c(91101908)	29.46805c(91101908)
40.0	125.66621 (91010508)	93.99398 (91010508)	72.99863 (91010508)	58.46937 (91010508)	47.99164 (91010508)
50.0	80.03124c(91060708)	60.95905c(91060708)	48.28051c(91060708)	39.32593c(91060708)	32.85877 (91112808)
60.0	77.27285c(91080108)	58.15710c(91080108)	45.65710c(91080108)	36.97604c(91080108)	30.68586c(91080108)
70.0	76.28754 (91082908)	57.15706 (91082908)	44.73486 (91082908)	36.22443 (91082908)	30.06884 (91082908)
80.0	69.64365c(91092308)	51.46194c(91092308)	39.89435c(91092308)	32.01835c(91092308)	26.43544c(91092308)
90.0	60.30401c(91042508)	45.07032c(91042508)	35.30156c(91042508)	28.63503c(91042508)	23.84902c(91042508)
100.0	64.15765c(91072008)	48.25515c(91072008)	37.95724c(91072008)	30.84473c(91072008)	25.70777c(91072008)
110.0	57.93451 (91112708)	43.86785 (91112708)	34.64913 (91112708)	28.31094 (91112708)	23.63206 (91112708)
120.0	69.57734c(91060608)	48.71628c(91060608)	36.09042c(91060608)	27.79035c(91060608)	22.03616c(91060608)
130.0	64.79253c(91060608)	52.64652c(91060608)	43.54440c(91060608)	36.84855c(91060608)	31.58040c(91060608)
140.0	81.02091c(91031308)	60.87294c(91031308)	47.47050c(91031308)	38.23632c(91031308)	31.63690c(91031308)
150.0	59.90496c(91010108)	39.89510c(91010108)	28.32520c(91010108)	20.94943c(91010108)	16.42352 (91092024)
160.0	64.29752c(91010108)	53.81478c(91010108)	45.49478c(91010108)	38.74283c(91010108)	33.62783c(91010108)
170.0	43.32109c(91010308)	32.35096 (91053024)	25.62922 (91053024)	20.92151 (91053024)	17.37284 (91053024)
180.0	51.24685 (91060308)	38.77922c(91010308)	32.53856c(91010308)	27.65083c(91010308)	23.81126c(91010308)
190.0	83.19331c(91042608)	65.10148c(91042608)	52.24569c(91042608)	42.98530c(91042608)	35.95040c(91042608)
200.0	79.57588c(91110608)	59.94737c(91110608)	46.74803c(91110608)	37.54803c(91110608)	30.98468c(91110608)
210.0	189.50061 (91020616)	150.78539 (91020616)	123.93432 (91020616)	104.88312 (91020616)	89.85500 (91020616)
220.0	324.70502 (91020616)	280.95227 (91020616)	247.70015 (91020616)	220.23038 (91020616)	199.66042 (91020616)
230.0	236.28983 (91020616)	213.66110 (91020616)	193.69214 (91020616)	177.72375 (91020616)	164.71423 (91020616)
240.0	103.09106 (91020624)	83.42712 (91020624)	70.01346 (91020624)	59.44614 (91020624)	51.65486 (91020624)
250.0	210.99493 (91020624)	184.25580 (91020624)	164.08871 (91020624)	147.86662 (91020624)	134.99814 (91020624)
260.0	151.16858 (91020624)	133.74049 (91020624)	119.90862 (91020624)	108.65720 (91020624)	99.29198 (91020624)
270.0	41.90077 (91020624)	35.87097 (91020624)	30.94081 (91020624)	27.20287 (91020624)	24.23845 (91020624)
280.0	26.41795 (91043024)	20.59050 (91043024)	16.55695 (91043024)	13.68610 (91043024)	11.55035 (91043024)
290.0	28.18841c(91031708)	22.53213c(91031708)	18.59902c(91031708)	15.68445c(91031708)	13.47465c(91031708)
300.0	35.47543 (91070408)	28.66676 (91070408)	23.78571 (91070408)	20.10645 (91070408)	17.27753 (91070408)
310.0	60.12603 (91042408)	48.24719 (91042408)	39.97467 (91042408)	33.81556 (91042408)	29.14978 (91042408)
320.0	60.87812c(91100508)	50.61759c(91100508)	43.02139c(91100508)	37.08286c(91100508)	32.51394c(91100508)
330.0	50.30587c(91100508)	36.17367c(91100508)	27.34937c(91100508)	21.43218c(91100508)	17.36259c(91100508)
340.0	52.47671 (91032924)	47.06724 (91032924)	42.61597 (91032924)	39.21096 (91032924)	36.25954 (91032924)
350.0	57.18090c(91072824)	45.18855 (91032924)	38.35537 (91032924)	33.97110 (91032924)	29.12724 (91032924)
360.0	55.70256c(91102624)	47.43810 (91101508)	40.73560 (91101508)	35.41557 (91101508)	30.82093 (91101508)

400349

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
-51.00	96.60	850.00482	(91042408)	-30.10	83.00	1125.63342	(91042408)
-9.00	69.50	1824.54517c	(91100508)	13.10	57.80	3279.37842c	(91100508)
35.50	46.80	3867.94922c	(91072824)	53.80	30.40	9300.34863c	(91010124)
66.90	9.10	59081.02340	(91010508)	84.30	-8.70	14907.16700	(91100708)
75.10	-28.30	17695.12300c	(91031308)	59.70	-48.00	7006.03564c	(91010308)
44.20	-67.70	4775.06689c	(91042608)	28.80	-87.40	2287.30151	(91092208)
13.40	-107.00	1681.86121c	(91110608)	-2.00	-126.70	1247.61328c	(91110608)
-19.60	-111.20	1058.03442	(91020616)	-37.30	-93.60	1499.82251	(91020616)
-54.90	-75.90	921.56006	(91090708)	-60.20	-58.00	843.32745c	(91032808)
-78.50	-40.90	1016.92566	(91102324)	-96.10	-39.00	823.95953	(91020624)
-113.90	-21.50	460.66687	(91020624)	-126.50	-2.00	300.37509	(91050424)
-111.90	18.00	323.27957	(91043024)	-96.60	37.80	262.94727	(91042008)
-81.30	57.60	328.54254c	(91031708)	-65.90	77.30	704.56531	(91070408)

400350

*** THE 1ST HIGHEST 8-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): ORIGIN , SRC1 ,

*** DISCRETE POLAR RECEPTOR POINTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC	(YYMMDDHH)	ORIGIN SRCID	DIST (M)	DIR (DEG)	CONC	(YYMMDDHH)
ORIGIN :	75.00	10.00	1297.71997c	(91100508)	ORIGIN :	100.00	10.00	1353.17688c	(91072824)
ORIGIN :	75.00	20.00	2054.33911c	(91072824)	ORIGIN :	100.00	20.00	1570.49475c	(91072824)
ORIGIN :	75.00	30.00	3449.16895c	(91072824)	ORIGIN :	100.00	30.00	1778.03052	(91101508)
ORIGIN :	75.00	40.00	2846.62012	(91051024)	ORIGIN :	100.00	40.00	3294.41187c	(91020208)
ORIGIN :	75.00	50.00	7359.45264	(91101508)	ORIGIN :	100.00	50.00	3142.22876c	(91020208)
ORIGIN :	75.00	60.00	11707.66310c	(91020208)	ORIGIN :	100.00	60.00	4534.99512	(91010508)
ORIGIN :	75.00	70.00	15168.26860	(91020508)	ORIGIN :	100.00	70.00	7415.25146	(91010508)
ORIGIN :	75.00	80.00	32141.11130	(91010508)	ORIGIN :	100.00	80.00	7285.32471c	(91080108)
ORIGIN :	100.00	90.00	6512.49561c	(91042508)	ORIGIN :	100.00	100.00	5552.91650	(91112708)
ORIGIN :	100.00	110.00	7952.94385c	(91060608)	ORIGIN :	100.00	120.00	4941.59619c	(91031308)
ORIGIN :	100.00	130.00	4268.49561c	(91010108)	ORIGIN :	100.00	140.00	2327.62378c	(91010308)
ORIGIN :	100.00	150.00	1986.19238	(91060308)	ORIGIN :	100.00	160.00	2459.97485c	(91042608)
ORIGIN :	100.00	210.00	1179.42065	(91020616)	ORIGIN :	100.00	220.00	684.16418	(91090708)
ORIGIN :	100.00	230.00	700.89844	(91020624)	ORIGIN :	100.00	240.00	909.24323	(91020624)
ORIGIN :	100.00	310.00	452.65796	(91070408)	ORIGIN :	100.00	340.00	987.92188c	(91100508)
ORIGIN :	75.00	350.00	1643.96179c	(91100508)	ORIGIN :	100.00	350.00	1221.00012c	(91100508)
ORIGIN :	75.00	360.00	2031.29956c	(91100508)	ORIGIN :	100.00	360.00	737.80811	(91082924)

400351

*** THE SUMMARY OF MAXIMUM PERIOD (8760 HRS) RESULTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

GROUP ID		AVERAGE CONC		RECEPTOR (XR,	YR,	ZELEV,	ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	1ST HIGHEST VALUE IS	5717.21631	AT (	66.90,	9.10,	0.00,	0.00)	DC	NA
	2ND HIGHEST VALUE IS	2637.21118	AT (	73.86,	13.02,	0.00,	0.00)	DP	NA
	3RD HIGHEST VALUE IS	1008.90204	AT (	84.30,	-8.70,	0.00,	0.00)	DC	NA
	4TH HIGHEST VALUE IS	862.19305	AT (	70.48,	25.65,	0.00,	0.00)	DP	NA
	5TH HIGHEST VALUE IS	733.36005	AT (	75.10,	-28.30,	0.00,	0.00)	DC	NA
	6TH HIGHEST VALUE IS	620.74976	AT (	98.48,	17.36,	0.00,	0.00)	DP	NA
	7TH HIGHEST VALUE IS	532.31885	AT (	53.80,	30.40,	0.00,	0.00)	DC	NA
	8TH HIGHEST VALUE IS	509.98785	AT (	93.97,	34.20,	0.00,	0.00)	DP	NA
	9TH HIGHEST VALUE IS	446.53497	AT (	100.00,	0.00,	0.00,	0.00)	DP	NA
	10TH HIGHEST VALUE IS	378.06754	AT (	64.95,	37.50,	0.00,	0.00)	DP	NA

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

400352

**MODELOPTs:
CONC   URBAN FLAT   DFAULT   NOCMPL

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF OTHER IN (MICROGRAMS/CUBIC-METER) **

GROUP ID			AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZFLAG)				OF TYPE	NETWORK GRID-ID
ALL	HIGH	1ST HIGH VALUE IS	59081.02340	ON 91010508: AT (	66.90,	9.10,	0.00,	0.00)	DC	NA

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

400353

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**MODELOPTs:
CONC                          URBAN  FLAT          DFAULT                                          NOCMPL

*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of          0 Fatal Error Message(s)
A Total of          1 Warning Message(s)
A Total of        196 Informational Message(s)

A Total of        196 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***   NONE   ***

   ********   WARNING MESSAGES   ********
SO W320     17 PPARM :Input Parameter May Be Out-of-Range for Parameter       QS

   ************************************
   *** ISCST3 Finishes Successfully ***
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400354

APPENDIX D

SHORT-TERM HEALTH RISK EVALUATION DURING EXCAVATION

SHORT-TERM HEALTH RISK EVALUATION DURING EXCAVATION

1.0 INTRODUCTION

A quantitative short-term risk evaluation was carried out for unprotected off-Site workers and pedestrians[1] on the streets that bound the Site who may be exposed to VOCs emanating from the sludge area excavation. The evaluation follows the stepwise approach in accordance with the USEPA Risk Assessment Guidance for Superfund (USEPA RAGS, 1989). Specifically, this approach consists of:

1. Identification of Chemicals of Potential Concern (COPCs);
2. Estimation of exposure point concentrations for identified COPCs;
3. Estimation of chemical intakes;
4. Toxicity assessment; and
5. Risk Characterization.

Each of these steps is explained in detail in the following subsections.

1.1 Identification of Chemicals of Potential Concern (COPCs)

For the purposes of this evaluation, all VOCs detected in the sludge area during the FFSI (Golder 1997) were identified as COPCs. Table D-1 summarizes the detection frequencies, range of detections, calculated arithmetic means and 95 percent upper confidence level of the mean (95% UCL) for VOCs in the sludge material.

1.2 Estimation of Exposure Point Concentrations for COPCs

For each COPC, the Reasonable Maximum Exposure (RME) concentrations were applied as the source concentrations for input values into the emission and dispersion modelling (Appendix C) to estimate the exposure point concentrations at fence line receptors.

[1] The short-term risk for the on-Site (remedial workers) were not quantitatively assessed.

USEPA defines the RME concentration as the 95% UCL of the mean of concentrations reported in the media being evaluated. The procedures for the determination of the 95%UCLs are based upon principles which require that the data be characterized by the normal distribution (or that the data can be transformed such that the normal distribution is appropriate characterization). The assumption of normality is common for many parametric procedures used (e.g. tolerance limits, t-tests). The principal method applied to test data for normality is the Shapiro-Wilk test.

The Shapiro-Wilk test (W) test (Shapiro & Wilk, 1965) was used to determine whether or not a set of 50 or fewer data are normally distributed. The Shapiro-Wilk test was carried out by calculating a test statistic (W) and comparing it against a critical value for a given level of significance (e.g., typically 95 percent). If the calculated value is greater than the critical value, then the data have been shown to fit the distribution tested. Table D-1 presents the results of the normality test for each COPC.

For a normally-distributed data set, the 95% UCL was calculated as follows:

$$95\%\ \mathrm{UCL} = \overline{\mathrm{x}} + \mathrm{t} \cdot \mathrm{S}/\sqrt{\mathrm{n}}$$

where:

95% UCL	=	upper confidence limit of the mean;
$\overline{x}$	=	mean of the untransformed data;
t	=	student t-statistic;
S	=	standard deviation of the untransformed data; and
n	=	number of samples.

For a log-normally distributed data set, the 95% UCL was calculated as follows:

$$95\%\ \mathrm{UCL} = e^{(\overline{x} + 0.5s2 + sH/\sqrt{n-1})}$$

where:

95% UCL	=	upper confidence limit of the mean;
e	=	constant (base of the natural log, equal to 2.718);
$\overline{x}$	=	mean of the transformed data;
H	=	H-statistic (e.g., from table published in Gilbert 1987);
s	=	standard deviation of the transformed data; and
n	=	number of samples.

These equations are consistent with the USEPA "Supplemental Guidance to RAGS: Calculating the Concentration Term", (USEPA, May 1992). Due to variability within the data points, or the limited number of data, the 95% UCL concentration may exceed the maximum concentration detected. In these cases, the maximum concentration was used as the source concentration that in turn was used to estimate the exposure point concentration for the RME. This approach is consistent with USEPA Guidance (USEPA, 1989) and is regarded as a conservative approach.

Table D-1 presents the calculated 95% UCL concentrations and the RME concentrations used as input into the air emission and dispersion modelling (see Appendix C).

The following two scenarios were evaluated in this assessment:

(1) assuming no air control are in place to mitigate vapor emission and dispersion from the sludge area during extraction; and

(2) assuming air controls are in place to mitigate vapor emission; however, a two-hour operational failure of the air control occurs whereby vapors from the sludge area.

The resultant modeled air concentrations for the above noted scenarios are presented in Table D-2.

1.3 Estimation Of Intake

To quantify exposures, potential exposure scenarios were developed using exposure assumptions presented in the USEPA documents entitled, "Risk Assessment Guidance for Superfund (RAGS), Part I: Human Health Evaluation Manual", EPA/540/1-89/002, December 1989; "RAGS Supplemental Guidance Standard Default Exposure Factors", OSWER Directive 9285.6-03, March 25, 1991; and "Exposure Factors Handbook", EPA/600/P-95/002Fa, August 1997. In some instances, where the USEPA documents did not present necessary assumptions, and where specific appropriate exposure information were not available, professional judgement was applied to develop conservative assumptions which are protective of human health.

To quantify intakes of COPCs by inhalation, the following equation is applied:

$$\text{Intake} = \frac{CA * IR * ET * EF * ED}{AT * BW}$$

where:

Intake	=	Average daily intake of chemical (mg/kg/day);
CA	=	Concentration in air (mg/m^3);
IR	=	Inhalation Rate (m^3/hour);
ET	=	Exposure time (hours/day)
EF	=	Exposure frequency (days/year);
ED	=	Exposure duration (years);
BW	=	Body weight of receptor (kg); and
AT	=	Averaging time (period over which exposure is averaged – days).

The individual factors will be discussed further as necessary for the specific exposures that can be reasonably expected at the Site.

During sludge area excavation, it is possible for VOC vapors emanating from the open excavation to migrate off-Site and potentially impact off-Site receptors. As such, unprotected off-Site workers and pedestrians could potentially be exposed to VOC vapors at the property fence line. The following exposure scenarios were evaluated.

a) Off-Site Worker Exposure to Ambient Air

The following health-protective assumptions were used to calculate exposures, as appropriate.

- The hourly inhalation rate assumed for adult workers is 2.5 m^3/hour for the RME.
- The exposure time for an adult worker is 8 hours/day for the RME.
- The worker is potentially exposed to impacted air for 5 days per week for ten weeks (a total of 50 days) which is assumed to be duration of the sludge area excavation.
- A body weight of 70 kg is assumed for an adult worker.
- The averaging time for carcinogens is 70 years times 365 days per year or 25,550 days.
- The averaging time for non-carcinogens is 365 days per year times the exposure duration (ED).

The exposure scenario details, references, and risk calculation tables are presented in Attachment 1, Tables 1 to 4, inclusive, for the potential exposure by area workers to impacted ambient air assuming that there are no air controls in place at the sludge area.

The exposure scenario details, references, and risk calculation tables are presented in Attachment 1, Tables 5 to 8, inclusive, for the potential exposure by area workers to impacted ambient air assuming air controls are in place but, a two-hour operational failure occurs during which VOC vapors are released.

b) Pedestrian Exposure to Ambient Air

The following health-protective assumptions were used to calculate exposures, as appropriate.

- The hourly inhalation rate assumed for an adult receptor is 2.5 m^3/hour for the RME.
- The exposure time for the adult pedestrian is 1 hour/day for the RME.
- The same pedestrian is potentially exposed to impacted air for 5 days per week for ten weeks (a total of 50 days) which is assumed to be duration of the sludge area remediation.
- A body weight of 70 kg is assumed for the adult pedestrian.
- The averaging time for carcinogens is 70 years times 365 days per year or 25,550 days.
- The averaging time for non-carcinogens is 365 days per year times the exposure duration (ED).

The exposure scenario details, references, and risk calculation tables are presented in Attachment 1, Tables 9 to 12, inclusive, for the potential exposure by a pedestrian to impacted ambient air assuming that there are no air controls in place at the sludge area.

The exposure scenario details, references, and risk calculation tables are presented in Attachment 1, Tables 13 to 16, inclusive, for the potential exposure by a pedestrian to impacted ambient air assuming air controls are in place but, a two-hour operational failure occurs during which VOC vapors are released.

1.4 Toxicity Assessment

The purpose of the toxicity assessment is to summarize potential adverse health effects that may result from exposure to a particular COPC. The toxicity assessment also provides an indication of the extent of exposure to COPCs that could potentially result in adverse health effects.

Chemical-specific data, such as current inhalation Reference Doses (RfD_is) and inhalation Cancer Slope Factors (CSF_is), will be obtained from a hierarchy of toxicity information sources as follows: USEPA Integrated Risk Information System (IRIS), USEPA Health Effects Assessment Summary Tables (HEAST) and USEPA's National Center for Environmental Assessment (NCEA).

A Cancer Slope Factor (CSF) is applied to estimate the potential risk of cancer from an exposure. A Reference Dose (RfD) is applied to estimate the potential for non-carcinogenic effects to occur from the exposure.

The CSF is expressed as $(mg/kg/day)^{-1}$ and when multiplied by the lifetime average daily dose expressed as mg/kg/day will provide an estimate of the probability that the dose will cause cancer during the lifetime of the exposed individual.

For substances suspected to cause noncarcinogenic chronic effects, the health criteria are usually expressed as chronic intake levels or RfDs (in units of mg/kg-day) below which no adverse effects are expected. In contrast with the underlying toxicological model used by USEPA to assess carcinogenic risk, which assumes no threshold, the noncarcinogenic dose-response model postulates a "threshold." In other words, there is a level of exposure to a chemical below which virtually no effects are expected.

In this assessment, chronic RfDs are used as the toxicity values for noncarcinogenic health effects. A chronic RfD is defined as an estimate (with uncertainty spanning an order of magnitude or greater) of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime.

1.5 Risk Characterization

Exposure situations may involve the potential exposure to more than one carcinogen. To assess the potential for carcinogenic effects posed by exposure to multiple carcinogens, it is assumed in the absence of information on synergistic or antagonistic effects that carcinogenic risks are additive. This approach is based on Guidelines for Health Risk Assessment of Chemical Mixtures (USEPA, 1986a) and Guidelines for Cancer Risk Assessment (USEPA, 1986b).
The estimated carcinogenic risk is calculated using the following formula:

$$\text{Risk} = \text{Intake} \times \text{CSF}$$

where:

Risk = Estimated upper bound incremental risk of cancer.

Intake = Chemical exposure calculated by applying the scenarios noted above and expressed as mg/kg/day. This exposure is the daily exposure for the exposure duration averaged over the individual's expected lifetime of 70 years.

CSF = Cancer Slope Factor which is a factor expressing the potential for carcinogenic response based on a theoretical model. This factor is expressed as 1/(mg/kg/day).

The USEPA cancer classification and the CSFs for identified COPCs for the sludge area are presented in Table D-3.

The individual risks from several chemicals for the same exposure scenario are considered additive. This is a conservative assumption suggested by USEPA guidance.

The hazard of non-carcinogenic adverse effects from exposure to a chemical is expressed as the Hazard Quotient (HQ) and is calculated as follows:

$$\text{Hazard Quotient (HQ)} = \frac{\text{Intake}}{\text{RfD}}$$

where:

Hazard Quotient (HQ) = The relationship between the calculated dose of a chemical and a reference dose which is not expected to cause adverse effects from a lifetime exposure. A hazard quotient below 1.0 is considered protective of health if exposure is to a single chemical.

Intake = Chemical exposure calculated by applying the scenarios noted above and expressed as mg/kg/day. This intake is the average intake for the expected period of exposure or exposure duration.

RfD = Reference Dose which is a daily dose based on experimental study and/or human experience and is believed to not cause an adverse effect from even a lifetime exposure.

The inhalation RfD values for identified COPCs for the sludge area are presented in Table D-3.

The Hazard Index (HI) for an exposure situation is the sum of the Hazard Quotients for the individual chemical exposures presented by the several exposure scenarios which can reasonably occur to the same individual. A hazard index below 1.0 is considered health protective for a lifetime exposure and is therefore not an exposure of concern.

Table D-4 summarizes the estimated additional lifetime cancer risks and hazard indices for all exposure scenarios evaluated.

Without Air Controls

Assuming that there are no air controls operating at the sludge area during excavation, the estimated lifetime incremental cancer risks (ELICR) associated with the sludge excavation is one (1) per 100 exposed worker population at the fence line for the RME scenario. The ELICR for the pedestrian off Site is 1 per 1000 exposed population at the fence line for the RME scenario.

The estimated hazard indices (HI) associated with the off-Site workers and pedestrian are 1,800 and 225, respectively.

With Air Controls

Assuming a two-hour operational failure of the air control system occurred whereby vapors from the sludge excavation area are released, the ELICR associated with sludge excavation is one (1) per 100,000 exposed worker population at the fence line for the RME scenario. The ELICR for the pedestrian off-Site is 6 per 1,000,000 exposed population at the fence line for the RME scenario.

The estimated HIs associated with the off-Site workers and pedestrian are 2.2 and 1.1, respectively.

TABLE D-1
SUMMARY OF DETECTION FREQUENCIES, RANGE OF DETECTED CONCENTRATIONS, CALCULATED ARITHMETIC MEANS AND 95% UCL CONCENTRATIONS FOR IDENTIFIED COPCs IN SLUDGE MATERIAL
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY

Compound	Frequency of Detection	Range of Concentration (ppm)	Average of Detects only (ppm)	Geometric mean (ppm)	Maximum Concentration (ppm)	Average Concentration Incl. Non-Detects (assumed at 1/2 of DL) (ppm)	Data Distribution Normal vs Log-Normal	95 % Upper Confidence Limit of the Mean (95% UCL)	Reasonable Maximum Exposure Point Concentration (ppm)
Benzene	7/8	28 - 73	46	43	73	42	NORMAL	59	**59**
2-Butanone	4/8	57 - 370	257	208	370	168	NORMAL	281	**281**
Chlorobenzene	8/8	8.4 - 1,200	290	130	1,200	290	LOG-NORMAL	6,531	**1,200**
Chloroform	4/8	30 - 340	166	107	340	111	NORMAL	210	**210**
1,1-Dichloroethane	5/8	3.4 - 210	80	37	210	91	NORMAL	147	**147**
Total 1,2-Dichloroethene	5/8	4.2 - 49	27	21	49	43	NORMAL	75	**49**
1,2-Dichloroethane	1/8	340	340	340	340	102	LOG-NORMAL	47	**47**
Ethylbenzene	8/8	100 - 1,100	653	461	1,100	653	LOG-NORMAL	3,029	**1,100**
Methylene Chloride	6/8	38 - 450	146	94	450	113	LOG-NORMAL	959	**450**
4-Methyl-2-Pentanone	7/8	19 - 470	245	146	470	227	LOG-NORMAL	1,726	**470**
1,1,1-Trichloroethane	4/8	150 - 2,700	1,120	676	2,700	588	LOG-NORMAL	108,946	**2,700**
Tetrachloroethene	8/8	330 - 8,900	3,635	1,965	8,900	3,635	NORMAL	6,416	**6,416**
Toluene	8/8	410 - 6,700	3,485	2,309	6,700	3,485	NORMAL	5,619	**5,619**
Trichloroethene	8/8	99 - 8,900	4,190	2,183	8,900	4,190	NORMAL	7,044	**7,044**
Vinyl Chloride	2/8	44 - 58	51	51	58	74	NORMAL	105	**58**
Total Xylenes	8/8	550 - 6,100	3,596	2,627	6,100	3,596	NORMAL	5,565	**5,565**

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Table D-2
Maximum Predicted COPC Concentration at the Fence Line
Associated with Sludge Area Extraction
216 Paterson Plank Road Site
Carlstadt, New Jersey

Contaminant	Maximum Emission Rate ($g/s/m^2$)	Concentration			
		Without Air Controls		With Air Controls (2)	
		8-hour (ug/m^3)	8-hour (ppm)	2-Hour (ppm)	2-Hour (ug/m^3)
Vinyl Chloride	0.017521	59,081	23.08	5.77	14,770
Benzene	0.000524	1,767	0.55	0.14	442
2-Butanone	0.000545	1,838	0.62	0.16	459
Chlorobenzene	0.000063	212	0.05	0.01	53
Chloroform	0.001118	3,770	0.77	0.19	942
1,1-Dichloroethane	0.001271	4,286	1.06	0.26	1,071
Total 1,2-Dichloroethene	0.001554	5,240	1.32	0.33	1,310
1,2-Dichloroethane	0.000447	1,507	0.37	0.09	377
Ethylbenzene	0.000049	165	0.04	0.01	41
Methylene Chloride	0.002445	8,245	2.38	0.59	2,061
4-Methyl-2-Pentanone	0.000112	378	0.09	0.02	94
1,1,1-Trichloroethane	0.000699	2,357	0.43	0.11	589
Tetrachloroethene	0.000098	330	0.05	0.01	83
Toluene	0.000147	496	0.13	0.03	124
Trichloroethene	0.000405	1,366	0.25	0.06	341
Total Xylenes	0.000063	212	0.05	0.01	53

Note:
(1) Maximum predicted using urban mode dispersion in ISCST3 model with 5 years of surface and upper air meteorological data from Newark/Atlantic City airports, respectively.
(2) Assuming operating air control is in place to mitigate vapor emission and dispersion however, a two-hour operational failure of the air control occurs releasing vapors from the sludge area.

TABLE D-3
Summary of Inhalation Reference Doses (RfDs) and
Cancer Slope Factors (CSFs)
216 Paterson Plank Road Site
Carlstadt, New Jersey

Compound	USEPA Weight-of-Evidence Classification (1)	Inhalation Toxicity - RfDi (mg/kg/d)	Inhalation Toxicity CSFi (1/(mg/kg/d))
Benzene	A	1.70E-03	2.90E-02
2-Butanone	D	2.86E-01	NA
Chlorobenzene	D	5.70E-03	NA
Chloroform	B2	8.60E-05	8.10E-02
1,1-Dichloroethane	C	1.40E-01	NA
Total 1,2-Dichloroethene		NA	NA
1,2-Dichloroethane	B2	1.40E-03	9.10E-02
Ethylbenzene	D	2.90E-01	NA
Methylene Chloride	B2	8.57E-01	1.65E-03
4-Methyl-2-Pentanone		2.00E-02	NA
1,1,1-Trichloroethane	D	2.86E-01	NA
Tetrachloroethene		1.40E-01	2.00E-03
Toluene	D	1.14E-01	NA
Trichloroethene	B2-C	NA	6.00E-03
Vinyl Chloride	A	NA	3.00E-01
Total Xylenes	D	NA	NA

Notes:
(1) The USEPA classification is based on an evaluation of the likelihood that the agent is a human carcinogen.
The evidence is characterized separately for human and animal studies as follows:

Group A - Known Human Carcinogen (sufficient evidence of carcinogenicity in humans);
Group B - Probable Human Carcinogen (Group B1 - limited evidence of carcinogenicity in humans;
and Group B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans);
Group C - Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data);
Group D - Not Classifiable as to Human Carcinogenicity (inadequate or no evidence); and
Group E - Evidence of Noncarcinogenicity for Humans (no evidence of carcinogenicity in animal studies).

(2) Taken from the USEPA Integrated Risk Information System (IRIS) Database, January 2001 or from the USEPA NCEA - provisional value.

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TABLE D-4
SUMMARY OF ESTIMATED LIFETIME INCREMENTAL CANCER RISKS AND HAZARD INDICES AT THE FENCE LINE ASSOCIATED WITH SLUDGE AREA EXCAVATION
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY

Receptor	*Sludge Area Excavation*	
	Without air controls	*With air controls*
	ELICR (1)/HI (2)	*ELICR (1)/HI (2)*
Off-site worker	1E-02/1,800	1E-05/2.2
Pedestrian	1E-03/225	6E-06/1.1

Notes:
(1) ELICR = Estimated Lifetime Incremental Cancer Risks
(2) HI = Hazard Index

ATTACHMENT D-1

TABLE: 1

EXPOSURE SCENARIO FORMULA AND ASSUMPTIONS

EXPOSURE SCENARIO : INHALATION BY WORKERS (WITHOUT AIR CONTROLS)
MEDIA: AIR
SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE

EQUATION : INTAKE (mg/kg-day) = $\dfrac{CA \times IR \times ET \times EF \times ED}{AT \times BW}$

where :
CA = Chemical Concentration in Air (mg/m3)
IR = Inhalation Rate (m3/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged -- days)

VARIABLE ASSUMPTIONS	RME	REFERENCES
CA (mg/m3)	Modelled Air Concentration	-
IR - adult (m3/hour)	2.5	RAGS (1, 2); EFH (3)
ET - (hours/day)	8	PROFESSIONAL JUDGEMENT
EF - (days/year)	50	PROFESSIONAL JUDGEMENT
ED - carcinogen (adult) (years)	1	PROFESSIONAL JUDGEMENT
ED - non-carcinogen (adult) (years)	1	PROFESSIONAL JUDGEMENT
BW (adult) kg	70	RAGS (1, 2)
AT (carcinogen) (70 yrs x 365 days/yr)	25550	RAGS (1, 2)
AT (non-carcinogen) (ED x 365 days/yr)	365	RAGS (1, 2)

NOTE:
(1) EPA "RISK ASSESSMENT GUIDANCE FOR SUPERFUND MANUAL, DECEMBER 1989, EPA/540/1-89/002.
(2) SUPPLEMENTAL GUIDANCE: "STANDARD DEFAULT EXPOSURE FACTORS", OSWER DIRECTIVE: 9285.6-03, MARCH 25, 1991.
(3) EXPOSURE FACTORS HANDBOOK, EPA/600/P-95/002Fa, August 1997.

TABLE: 2

MEDIA CONCENTRATIONS AND CHEMICAL CONSTANTS

SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE
MEDIA : AIR
EXPOSURE SCENARIO : INHALATION BY WORKERS (WITHOUT AIR CONTROLS)

PARAMETER	MEDIA CONCENTRATION MODELLED AIR CONCENTRATION mg/m3	INHALATION CSF (1) 1/(mg/kg/d)	INHALATION RfD (1) mg/kg/d
VOCs			
BENZENE	1.77E+00	2.90E-02	1.70E-03
2-BUTANONE	1.84E+00	NA	2.86E-01
CHLOROBENZENE	2.12E-01	NA	5.70E-03
CHLOROFORM	3.77E+00	8.10E-02	8.60E-05
1,1-DICHLOROETHANE	4.29E+00	NA	1.40E-01
TOTAL 1,2-DICHLOROETHENE	5.24E+00	NA	NA
1,2-DICHLOROETHANE	1.51E+00	9.10E-02	1.40E-03
ETHYLBENZENE	1.65E-01	NA	2.90E-01
METHYLENE CHLORIDE	8.25E+00	1.65E-03	8.57E-01
4-METHYL-2-PENTANONE	3.78E-01	NA	2.00E-02
1,1,1-TRICHLOROETHANE	2.36E+00	NA	2.86E-01
TETRACHLOROETHENE	3.30E-01	2.00E-03	1.40E-01
TOLUENE	4.96E-01	NA	1.14E-01
TRICHLOROETHENE	1.37E+00	6.00E-03	NA
VINYL CHLORIDE	5.91E+01	3.00E-01	NA
TOTAL XYLENES	2.12E-01	NA	NA

NA = NOT AVAILABLE
(1) CSF = Cancer Slope Factor
RfD = Reference Dose
Taken from the USEPA Integrated Risk Information System (IRIS) Database, January 2001.
or from the USEPA NCEA - provisional value.

TABLE: 3

EXPOSURE, RISK AND HAZARD CALCULATIONS

SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE
MEDIA : AIR
EXPOSURE SCENARIO : INHALATION BY WORKERS (WITHOUT AIR CONTROLS)

PARAMETER	LIFETIME AVERAGE DAILY INTAKE (mg/kg/day) RME	LIFETIME UPPER BOUND EXCESS CANCER RISK RME	ANNUAL AVERAGE DAILY INTAKE (mg/kg/d) RME	HAZARD QUOTIENT CDI/RfD RME
VOCs				
BENZENE	9.88E-04	2.87E-05	6.92E-02	4.07E+01
2-BUTANONE	1.03E-03	NV	7.19E-02	2.52E-01
CHLOROBENZENE	1.19E-04	NV	8.30E-03	1.46E+00
CHLOROFORM	2.11E-03	1.71E-04	1.48E-01	1.72E+03
1,1-DICHLOROETHANE	2.40E-03	NV	1.68E-01	1.20E+00
TOTAL 1,2-DICHLOROETHENE	2.93E-03	NV	2.05E-01	NV
1,2-DICHLOROETHANE	8.43E-04	7.67E-05	5.90E-02	4.21E+01
ETHYLBENZENE	9.23E-05	NV	6.46E-03	2.23E-02
METHYLENE CHLORIDE	4.61E-03	7.61E-06	3.23E-01	3.77E-01
4-METHYL-2-PENTANONE	2.11E-04	NV	1.48E-02	7.40E-01
1,1,1-TRICHLOROETHANE	1.32E-03	NV	9.23E-02	3.23E-01
TETRACHLOROETHENE	1.85E-04	3.69E-07	1.29E-02	9.23E-02
TOLUENE	2.77E-04	NV	1.94E-02	1.70E-01
TRICHLOROETHENE	7.64E-04	4.58E-06	5.35E-02	NV
VINYL CHLORIDE	3.30E-02	9.91E-03	2.31E+00	NV
TOTAL XYLENES	1.19E-04	NV	8.30E-03	NV

	TOTAL LIFETIME ADDED CANCER RISK:	1.02E-02	**HAZARD INDEX:**	1.80E+03

TABLE: 4

SUMMARY TABLE

SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE
MEDIA : AIR
EXPOSURE SCENARIO : INHALATION BY WORKERS (WITHOUT AIR CONTROLS)

PARAMETER	MEDIA CONCENTRATION Action Level mg/m3	LIFETIME UPPER BOUND EXCESS CANCER RISK RME 95th %	HAZARD QUOTIENT CDI/RfD RME 95th %
VOCs			
BENZENE	1.77E+00	2.87E-05	4.07E+01
2-BUTANONE	1.84E+00	NV	2.52E-01
CHLOROBENZENE	2.12E-01	NV	1.46E+00
CHLOROFORM	3.77E+00	1.71E-04	1.72E+03
1,1-DICHLOROETHANE	4.29E+00	NV	1.20E+00
TOTAL 1,2-DICHLOROETHENE	5.24E+00	NV	NV
1,2-DICHLOROETHANE	1.51E+00	7.67E-05	4.21E+01
ETHYLBENZENE	1.65E-01	NV	2.23E-02
METHYLENE CHLORIDE	8.25E+00	7.61E-06	3.77E-01
4-METHYL-2-PENTANONE	3.78E-01	NV	7.40E-01
1,1,1-TRICHLOROETHANE	2.36E+00	NV	3.23E-01
TETRACHLOROETHENE	3.30E-01	3.69E-07	9.23E-02
TOLUENE	4.96E-01	NV	1.70E-01
TRICHLOROETHENE	1.37E+00	4.58E-06	NV
VINYL CHLORIDE	5.91E+01	9.91E-03	NV
TOTAL XYLENES	2.12E-01	NV	NV
	TOTAL LIFETIME ADDED CANCER RISK:	1.02E-02	
	HAZARD INDEX:		1.80E+03

TABLE: 5

EXPOSURE SCENARIO FORMULA AND ASSUMPTIONS

EXPOSURE SCENARIO : INHALATION BY WORKERS (WITH AIR CONTROLS ASSUMING OPERATIONAL FAILURE)
MEDIA: AIR
SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE

$$\text{EQUATION : INTAKE (mg/kg-day)} = \frac{CA \times IR \times ET \times EF \times ED}{AT \times BW}$$

where :
CA = Chemical Concentration in Air (mg/m3)
IR = Inhalation Rate (m3/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged -- days)

VARIABLE ASSUMPTIONS	RME	REFERENCES
CA (mg/m3)	Modelled Air Concentration	-
IR - adult (m3/hour)	2.5	RAGS (1, 2); EFH (3)
ET - (hours/day)	2	PROFESSIONAL JUDGEMENT
EF - (days/year)	1	PROFESSIONAL JUDGEMENT
ED - carcinogen (adult) (years)	1	PROFESSIONAL JUDGEMENT
ED - non-carcinogen (adult) (years)	1	PROFESSIONAL JUDGEMENT
BW (adult) kg	70	RAGS (1, 2)
AT (carcinogen) (70 yrs x 365 days/yr)	25550	RAGS (1, 2)
AT (non-carcinogen) (ED x 365 days/yr)	365	RAGS (1, 2)

NOTE:
(1) EPA "RISK ASSESSMENT GUIDANCE FOR SUPERFUND MANUAL, DECEMBER 1989, EPA/540/1-89/002.
(2) SUPPLEMENTAL GUIDANCE: "STANDARD DEFAULT EXPOSURE FACTORS", OSWER DIRECTIVE: 9285.6-03, MARCH 25, 1991.
(3) EXPOSURE FACTORS HANDBOOK, EPA/600/P-95/002Fa, August 1997.

TABLE: 6

MEDIA CONCENTRATIONS AND CHEMICAL CONSTANTS

SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE
MEDIA : AIR
EXPOSURE SCENARIO : INHALATION BY WORKERS (WITH AIR CONTROLS ASSUMING OPERATIONAL FAILURE)

PARAMETER	MEDIA CONCENTRATION MODELLED AIR CONCENTRATION mg/m3	INHALATION CSF 1/(mg/kg/d)	INHALATION RfD mg/kg/d
VOCs			
BENZENE	4.47E-01	2.90E-02	1.70E-03
2-BUTANONE	4.72E-01	NA	2.86E-01
CHLOROBENZENE	4.61E-02	NA	5.70E-03
CHLOROFORM	9.27E-01	8.10E-02	8.60E-05
1,1-DICHLOROETHANE	1.05E+00	NA	1.40E-01
TOTAL 1,2-DICHLOROETHENE	1.31E+00	NA	NA
1,2-DICHLOROETHANE	3.65E-01	9.10E-02	1.40E-03
ETHYLBENZENE	4.34E-02	NA	2.90E-01
METHYLENE CHLORIDE	2.05E+00	1.65E-03	8.57E-01
4-METHYL-2-PENTANONE	8.20E-02	NA	2.00E-02
1,1,1-TRICHLOROETHANE	6.01E-01	NA	2.86E-01
TETRACHLOROETHENE	6.78E-02	2.00E-03	1.40E-01
TOLUENE	1.13E-01	NA	1.14E-01
TRICHLOROETHENE	3.22E-01	6.00E-03	NA
VINYL CHLORIDE	1.48E+01	3.00E-01	NA
TOTAL XYLENES	4.34E-02	NA	NA

NA = NOT AVAILABLE
(1) CSF = Cancer Slope Factor
RfD = Reference Dose
Taken from the USEPA Integrated Risk Information System (IRIS) Database, January 2001.
or from the USEPA NCEA - provisional value.

TABLE: 7

EXPOSURE, RISK AND HAZARD CALCULATIONS

SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE
MEDIA : AIR
EXPOSURE SCENARIO : INHALATION BY WORKERS (WITH AIR CONTROLS ASSUMING OPERATIONAL FAILURE)

	LIFETIME AVERAGE DAILY INTAKE (mg/kg/day)	LIFETIME UPPER BOUND EXCESS CANCER RISK	ANNUAL AVERAGE DAILY INTAKE (mg/kg/d)	HAZARD QUOTIENT CDI/RfD
PARAMETER	RME	RME	RME	RME
VOCs				
BENZENE	1.25E-06	3.62E-08	8.74E-05	5.14E-02
2-BUTANONE	1.32E-06	NV	9.24E-05	3.23E-04
CHLOROBENZENE	1.29E-07	NV	9.02E-06	1.58E-03
CHLOROFORM	2.59E-06	2.10E-07	1.81E-04	2.11E+00
1,1-DICHLOROETHANE	2.94E-06	NV	2.06E-04	1.47E-03
TOTAL 1,2-DICHLOROETHENE	3.66E-06	NV	2.56E-04	NV
1,2-DICHLOROETHANE	1.02E-06	9.27E-08	7.13E-05	5.10E-02
ETHYLBENZENE	1.21E-07	NV	8.49E-06	2.93E-05
METHYLENE CHLORIDE	5.72E-06	9.44E-09	4.01E-04	4.67E-04
4-METHYL-2-PENTANONE	2.29E-07	NV	1.60E-05	8.02E-04
1,1,1-TRICHLOROETHANE	1.68E-06	NV	1.18E-04	4.11E-04
TETRACHLOROETHENE	1.90E-07	3.79E-10	1.33E-05	9.48E-05
TOLUENE	3.16E-07	NV	2.21E-05	1.94E-04
TRICHLOROETHENE	9.01E-07	5.40E-09	6.31E-05	NV
VINYL CHLORIDE	4.13E-05	1.24E-05	2.89E-03	NV
TOTAL XYLENES	1.21E-07	NV	8.49E-06	NV
	TOTAL LIFETIME ADDED CANCER RISK:	1.27E-05	**HAZARD INDEX:**	2.22E+00

TABLE: 8

SUMMARY TABLE

SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE
MEDIA : AIR
EXPOSURE SCENARIO : INHALATION BY WORKERS (WITH AIR CONTROLS ASSUMING OPERATIONAL FAILURE

PARAMETER	MEDIA CONCENTRATION Action Level mg/m3	LIFETIME UPPER BOUND EXCESS CANCER RISK RME 95th %	HAZARD QUOTIENT CDI/RfD RME 95th %
VOCs			
BENZENE	4.47E-01	3.62E-08	5.14E-02
2-BUTANONE	4.72E-01	NV	3.23E-04
CHLOROBENZENE	4.61E-02	NV	1.58E-03
CHLOROFORM	9.27E-01	2.10E-07	2.11E+00
1,1-DICHLOROETHANE	1.05E+00	NV	1.47E-03
TOTAL 1,2-DICHLOROETHENE	1.31E+00	NV	NV
1,2-DICHLOROETHANE	3.65E-01	9.27E-08	5.10E-02
ETHYLBENZENE	4.34E-02	NV	2.93E-05
METHYLENE CHLORIDE	2.05E+00	9.44E-09	4.67E-04
4-METHYL-2-PENTANONE	8.20E-02	NV	8.02E-04
1,1,1-TRICHLOROETHANE	6.01E-01	NV	4.11E-04
TETRACHLOROETHENE	6.78E-02	3.79E-10	9.48E-05
TOLUENE	1.13E-01	NV	1.94E-04
TRICHLOROETHENE	3.22E-01	5.40E-09	NV
VINYL CHLORIDE	1.48E+01	1.24E-05	NV
TOTAL XYLENES	4.34E-02	NV	NV
	TOTAL LIFETIME ADDED CANCER RISK:	1.27E-05	
		HAZARD INDEX:	2.22E+00

TABLE: 9

EXPOSURE SCENARIO FORMULA AND ASSUMPTIONS

EXPOSURE SCENARIO : INHALATION BY PEDESTRIAN (WITHOUT AIR CONTROLS)
MEDIA: AIR
SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE

EQUATION : INTAKE (mg/kg-day) = $\frac{CA \times IR \times ET \times EF \times ED}{AT \times BW}$

where :
CA = Chemical Concentration in Air (mg/m3)
IR = Inhalation Rate (m3/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged -- days)

VARIABLE ASSUMPTIONS	RME	REFERENCES
CA (mg/m3)	Modelled Air Concentration	-
IR - adult (m3/hour)	2.5	RAGS (1, 2); EFH (3)
ET - (hours/day)	1	PROFESSIONAL JUDGEMENT
EF - (days/year)	50	PROFESSIONAL JUDGEMENT
ED - carcinogen (adult) (years)	1	PROFESSIONAL JUDGEMENT
ED - non-carcinogen (adult) (years)	1	PROFESSIONAL JUDGEMENT
BW (adult) kg	70	RAGS (1, 2)
AT (carcinogen) (70 yrs x 365 days/yr)	25550	RAGS (1, 2)
AT (non-carcinogen) (ED x 365 days/yr)	365	RAGS (1, 2)

NOTE:
(1) EPA "RISK ASSESSMENT GUIDANCE FOR SUPERFUND MANUAL, DECEMBER 1989, EPA/540/1-89/002.
(2) SUPPLEMENTAL GUIDANCE: "STANDARD DEFAULT EXPOSURE FACTORS", OSWER DIRECTIVE: 9285.6-03, MARCH 25, 1991.
(3) EXPOSURE FACTORS HANDBOOK, EPA/600/P-95/002Fa, August 1997.

TABLE: 10

MEDIA CONCENTRATIONS AND CHEMICAL CONSTANTS

SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE
MEDIA : AIR
EXPOSURE SCENARIO : INHALATION BY PEDESTRIAN (WITHOUT AIR CONTROLS)

PARAMETER	MEDIA CONCENTRATION MODELLED AIR CONCENTRATION mg/m3	INHALATION CSF 1/(mg/kg/d)	INHALATION RfD mg/kg/d
VOCs			
BENZENE	1.77E+00	2.90E-02	1.70E-03
2-BUTANONE	1.84E+00	NA	2.86E-01
CHLOROBENZENE	2.12E-01	NA	5.70E-03
CHLOROFORM	3.77E+00	8.10E-02	8.60E-05
1,1-DICHLOROETHANE	4.29E+00	NA	1.40E-01
TOTAL 1,2-DICHLOROETHENE	5.24E+00	NA	NA
1,2-DICHLOROETHANE	1.51E+00	9.10E-02	1.40E-03
ETHYLBENZENE	1.65E-01	NA	2.90E-01
METHYLENE CHLORIDE	8.25E+00	1.65E-03	8.57E-01
4-METHYL-2-PENTANONE	3.78E-01	NA	2.00E-02
1,1,1-TRICHLOROETHANE	2.36E+00	NA	2.86E-01
TETRACHLOROETHENE	3.30E-01	2.00E-03	1.40E-01
TOLUENE	4.96E-01	NA	1.14E-01
TRICHLOROETHENE	1.37E+00	6.00E-03	NA
VINYL CHLORIDE	5.91E+01	3.00E-01	NA
TOTAL XYLENES	2.12E-01	NA	NA

NA = NOT AVAILABLE
(1) CSF = Cancer Slope Factor
RfD = Reference Dose
Taken from the USEPA Integrated Risk Information System (IRIS) Database, January 2001.
or from the USEPA NCEA - provisional value.

TABLE: 11

EXPOSURE, RISK AND HAZARD CALCULATIONS

SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE
MEDIA : AIR
EXPOSURE SCENARIO : INHALATION BY PEDESTRIAN (WITHOUT AIR CONTROLS)

PARAMETER	LIFETIME AVERAGE DAILY INTAKE (mg/kg/day)	LIFETIME UPPER BOUND EXCESS CANCER RISK	ANNUAL AVERAGE DAILY INTAKE (mg/kg/d)	HAZARD QUOTIENT CDI/RfD
	RME	RME	RME	RME
VOCs				
BENZENE	1.23E-04	3.58E-06	8.64E-03	5.09E+00
2-BUTANONE	1.28E-04	NV	8.99E-03	3.14E-02
CHLOROBENZENE	1.48E-05	NV	1.04E-03	1.82E-01
CHLOROFORM	2.63E-04	2.13E-05	1.84E-02	2.14E+02
1,1-DICHLOROETHANE	3.00E-04	NV	2.10E-02	1.50E-01
TOTAL 1,2-DICHLOROETHENE	3.66E-04	NV	2.56E-02	NV
1,2-DICHLOROETHANE	1.05E-04	9.58E-06	7.37E-03	5.27E+00
ETHYLBENZENE	1.15E-05	NV	8.07E-04	2.78E-03
METHYLENE CHLORIDE	5.76E-04	9.51E-07	4.03E-02	4.71E-02
4-METHYL-2-PENTANONE	2.64E-05	NV	1.85E-03	9.25E-02
1,1,1-TRICHLOROETHANE	1.65E-04	NV	1.15E-02	4.03E-02
TETRACHLOROETHENE	2.31E-05	4.61E-08	1.61E-03	1.15E-02
TOLUENE	3.47E-05	NV	2.43E-03	2.13E-02
TRICHLOROETHENE	9.55E-05	5.73E-07	6.68E-03	NV
VINYL CHLORIDE	4.13E-03	1.24E-03	2.89E-01	NV
TOTAL XYLENES	1.48E-05	NV	1.04E-03	NV
	TOTAL LIFETIME ADDED CANCER RISK:	1.27E-03	**HAZARD INDEX:**	2.25E+02

TABLE: 12

SUMMARY TABLE

SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE
MEDIA : AIR
EXPOSURE SCENARIO : INHALATION BY PEDESTRIAN (WITHOUT AIR CONTROLS)

PARAMETER	MEDIA CONCENTRATION Action Level mg/m3	LIFETIME UPPER BOUND EXCESS CANCER RISK RME 95th %	HAZARD QUOTIENT CDI/RfD RME 95th %
VOCs			
BENZENE	1.77E+00	3.58E-06	5.09E+00
2-BUTANONE	1.84E+00	NV	3.14E-02
CHLOROBENZENE	2.12E-01	NV	1.82E-01
CHLOROFORM	3.77E+00	2.13E-05	2.14E+02
1,1-DICHLOROETHANE	4.29E+00	NV	1.50E-01
TOTAL 1,2-DICHLOROETHENE	5.24E+00	NV	NV
1,2-DICHLOROETHANE	1.51E+00	9.58E-06	5.27E+00
ETHYLBENZENE	1.65E-01	NV	2.78E-03
METHYLENE CHLORIDE	8.25E+00	9.51E-07	4.71E-02
4-METHYL-2-PENTANONE	3.78E-01	NV	9.25E-02
1,1,1-TRICHLOROETHANE	2.36E+00	NV	4.03E-02
TETRACHLOROETHENE	3.30E-01	4.61E-08	1.15E-02
TOLUENE	4.96E-01	NV	2.13E-02
TRICHLOROETHENE	1.37E+00	5.73E-07	NV
VINYL CHLORIDE	5.91E+01	1.24E-03	NV
TOTAL XYLENES	2.12E-01	NV	NV

TOTAL LIFETIME ADDED CANCER RISK: 1.27E-03

HAZARD INDEX: 2.25E+02

TABLE: 13

EXPOSURE SCENARIO FORMULA AND ASSUMPTIONS

EXPOSURE SCENARIO : INHALATION BY PEDESTRIAN (WITH AIR CONTROLS ASSUMING OPERATIONAL FAILURE)
MEDIA: AIR
SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE

EQUATION : INTAKE (mg/kg-day) = $\dfrac{CA \times IR \times ET \times EF \times ED}{AT \times BW}$

where :
CA = Chemical Concentration in Air (mg/m3)
IR = Inhalation Rate (m3/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged -- days)

VARIABLE ASSUMPTIONS	RME	REFERENCES
CA (mg/m3)	Modelled Air Concentration	-
IR - adult (m3/hour)	2.5	RAGS (1, 2); EFH (3)
ET - (hours/day)	1	PROFESSIONAL JUDGEMENT
EF - (days/year)	1	PROFESSIONAL JUDGEMENT
ED - carcinogen (adult) (years)	1	PROFESSIONAL JUDGEMENT
ED - non-carcinogen (adult) (years)	1	PROFESSIONAL JUDGEMENT
BW (adult) kg	70	RAGS (1, 2)
AT (carcinogen) (70 yrs x 365 days/yr)	25550	RAGS (1, 2)
AT (non-carcinogen) (ED x 365 days/yr)	365	RAGS (1, 2)

NOTE:
(1) EPA "RISK ASSESSMENT GUIDANCE FOR SUPERFUND MANUAL, DECEMBER 1989, EPA/540/1-89/002.
(2) SUPPLEMENTAL GUIDANCE: "STANDARD DEFAULT EXPOSURE FACTORS", OSWER DIRECTIVE: 9285.6-03, MARCH 25, 1991.
(3) EXPOSURE FACTORS HANDBOOK, EPA/600/P-95/002Fa, August 1997.

TABLE: 14

MEDIA CONCENTRATIONS AND CHEMICAL CONSTANTS

SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE
MEDIA : AIR
EXPOSURE SCENARIO : INHALATION BY PEDESTRIAN (WITH AIR CONTROLS ASSUMING OPERATIONAL FAILURE)

PARAMETER	MEDIA CONCENTRATION MODELLED AIR CONCENTRATION mg/m3	INHALATION CSF 1/(mg/kg/d)	INHALATION RfD mg/kg/d
VOCs			
BENZENE	4.47E-01	2.90E-02	1.70E-03
2-BUTANONE	4.72E-01	NA	2.86E-01
CHLOROBENZENE	4.61E-02	NA	5.70E-03
CHLOROFORM	9.27E-01	8.10E-02	8.60E-05
1,1-DICHLOROETHANE	1.05E+00	NA	1.40E-01
TOTAL 1,2-DICHLOROETHENE	1.31E+00	NA	NA
1,2-DICHLOROETHANE	3.65E-01	9.10E-02	1.40E-03
ETHYLBENZENE	4.34E-02	NA	2.90E-01
METHYLENE CHLORIDE	*2.05E+00*	*1.65E-03*	*8.57E-01*
4-METHYL-2-PENTANONE	8.20E-02	NA	2.00E-02
1,1,1-TRICHLOROETHANE	6.01E-01	NA	2.86E-01
TETRACHLOROETHENE	6.78E-02	2.00E-03	1.40E-01
TOLUENE	1.13E-01	NA	1.14E-01
TRICHLOROETHENE	3.22E-01	6.00E-03	NA
VINYL CHLORIDE	1.48E+01	3.00E-01	NA
TOTAL XYLENES	4.34E-02	NA	NA

NA = NOT AVAILABLE
(1) CSF = Cancer Slope Factor
RfD = Reference Dose
Taken from the USEPA Integrated Risk Information System (IRIS) Database, January 2001.
or from the USEPA NCEA - provisional value.

TABLE: 15

EXPOSURE, RISK AND HAZARD CALCULATIONS

SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE
MEDIA : AIR
EXPOSURE SCENARIO : INHALATION BY PEDESTRIAN (WITH AIR CONTROLS ASSUMING OPERATIONAL FAILURE)

	LIFETIME AVERAGE DAILY INTAKE (mg/kg/day)	LIFETIME UPPER BOUND EXCESS CANCER RISK	ANNUAL AVERAGE DAILY INTAKE (mg/kg/d)	HAZARD QUOTIENT CDI/RfD
PARAMETER	RME	RME	RME	RME
VOCs				
BENZENE	6.24E-07	1.81E-08	4.37E-05	2.57E-02
2-BUTANONE	6.60E-07	NV	4.62E-05	1.61E-04
CHLOROBENZENE	6.44E-08	NV	4.51E-06	7.91E-04
CHLOROFORM	1.30E-06	1.05E-07	9.07E-05	1.05E+00
1,1-DICHLOROETHANE	1.47E-06	NV	1.03E-04	7.36E-04
TOTAL 1,2-DICHLOROETHENE	1.83E-06	NV	1.28E-04	NV
1,2-DICHLOROETHANE	5.10E-07	4.64E-08	3.57E-05	2.55E-02
ETHYLBENZENE	6.07E-08	NV	4.25E-06	1.46E-05
METHYLENE CHLORIDE	2.86E-06	4.72E-09	2.00E-04	2.34E-04
4-METHYL-2-PENTANONE	1.15E-07	NV	8.02E-06	4.01E-04
1,1,1-TRICHLOROETHANE	8.40E-07	NV	5.88E-05	2.05E-04
TETRACHLOROETHENE	9.48E-08	1.90E-10	6.63E-06	4.74E-05
TOLUENE	1.58E-07	NV	1.11E-05	9.71E-05
TRICHLOROETHENE	4.50E-07	2.70E-09	3.15E-05	NV
VINYL CHLORIDE	2.06E-05	6.19E-06	1.45E-03	NV
TOTAL XYLENES	6.07E-08	NV	4.25E-06	NV
	TOTAL LIFETIME ADDED CANCER RISK:	6.37E-06	**HAZARD INDEX:**	1.11E+00

TABLE: 16

SUMMARY TABLE

SITE : 216 PATERSON PLANK ROAD SITE
SECTOR : NA
LOCATION : OFF-SITE
MEDIA : AIR
EXPOSURE SCENARIO : INHALATION BY PEDESTRIAN (WITH AIR CONTROLS ASSUMING OPERATIONAL FAILURE)

PARAMETER	MEDIA CONCENTRATION Action Level mg/m3	LIFETIME UPPER BOUND EXCESS CANCER RISK RME 95th %	HAZARD QUOTIENT CDI/RfD RME 95th %
VOCs			
BENZENE	4.47E-01	1.81E-08	2.57E-02
2-BUTANONE	4.72E-01	NV	1.61E-04
CHLOROBENZENE	4.61E-02	NV	7.91E-04
CHLOROFORM	9.27E-01	1.05E-07	1.05E+00
1,1-DICHLOROETHANE	1.05E+00	NV	7.36E-04
TOTAL 1,2-DICHLOROETHENE	1.31E+00	NV	NV
1,2-DICHLOROETHANE	3.65E-01	4.64E-08	2.55E-02
ETHYLBENZENE	4.34E-02	NV	1.46E-05
METHYLENE CHLORIDE	2.05E+00	4.72E-09	2.34E-04
4-METHYL-2-PENTANONE	8.20E-02	NV	4.01E-04
1,1,1-TRICHLOROETHANE	6.01E-01	NV	2.05E-04
TETRACHLOROETHENE	6.78E-02	1.90E-10	4.74E-05
TOLUENE	1.13E-01	NV	9.71E-05
TRICHLOROETHENE	3.22E-01	2.70E-09	NV
VINYL CHLORIDE	1.48E+01	6.19E-06	NV
TOTAL XYLENES	4.34E-02	NV	NV

TOTAL LIFETIME ADDED CANCER RISK: 6.37E-06

HAZARD INDEX: 1.11E+00

APPENDIX E

TRANSPORTATION AND DISPOSAL COST DETAIL

TRANSPORTATION AND DISPOSAL COSTS

Assumptions:

1. Volume of material – approx. 2,400 cu. yd. (65 feet W by 85 feet L x 12 feet D)[1]
2. 2,400 cu. yd. = approximately 3,600 tons
3. Material will require off-site treatment by incineration due to the concentration of PCBs in the sludge material.

Estimated costs are set out below; disposal facility quotations, upon which the costs are based, follow.

Safety-Kleen (Deer Park), Inc. – Deer Park, Texas

Disposal – Pricing ranges from $1.08/lb to $1.14/lb. This price assumes a surcharge of $0.08/lb due to concentrations of copper detected in the sludge material. The average concentration of copper detected in samples collected during the 1997 FFS investigation is 4,350 ppm and for the treatability study 5,000 ppm. This concentration falls within the Level 2 category for surcharges.

Transportation – Pricing is estimated at $5,689[2] per load. Assuming a maximum payload of 17.5 tons the number of loads transported off-site would be 189 for an estimated transportation cost of $1,075,221 or $0.16/lb. It should be noted that this cost assumes no demurrage charges and that the boxes would be loaded live. Additional costs would be incurred if the boxes were dropped off at the site and picked up at a later date or if they could not be loaded within 1-hour.

Additional Costs: Texas taxes - $0.01/lb.

The total estimated cost for T&D at this facility is estimated to range from $1.34/lb ($2,680/ton) to $1.40/lb ($2,800/ton) or $9,648,000 to $10,080,000.

Onyx Environmental Services – Port Arthur, Texas

Disposal – Pricing ranges from $0.22/lb to $0.50/lb. Additional testing of the sludge material would also be required to determine if the sludge material meets the stream qualifications of the disposal facility. It is possible that surcharges would apply.

Transportation – Pricing is estimated at $6,000[3] per load (17.5 ton payload). Assuming a maximum payload of 17.5 tons the number of truckloads transported off-site would be 189 for an estimated transportation cost of $1,134,000 or $0.17/lb. It should be noted that this cost assumes no demurrage charges and that the boxes would be loaded live. Additional costs would be incurred if the boxes were dropped off at the site and picked up at a later date (approximately $0.04/lb).

Additional Costs: Texas taxes - $0.01/lb.

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[1] The FFS Investigation report estimated 1,500 cu. yd. of sludge. The additional 950 cu. yd. of material is an estimate of additional material that will be excavated to ensure that all of the sludge material is removed. Further, this volume could increase by 10%-15% if material needs to be added to pass the paint filter test.

[2] Transportation price was increased as the price quote provided by Safety-Kleen was based on a pick-up location in Cherry Hill, NJ.

[3] Transportation price was increased as the price quote provided by Onyx was based on a pick-up location in Cherry Hill, NJ.

The total estimated cost for T&D at this facility is estimated to range from \$0.40/lb (\$800/ton) to \$0.68/lb (\$1,360/ton) or \$2,880,000 to \$4,896,000.

In summary, based on the two price quotes provided the range in cost associated with T&D of the sludge material is \$800/ton to \$2,800/ton not including any remediation contractor mark-up. The estimated T&D costs provided in this FFS Report assumes \$1,400/ton. As indicated by the prices provided, the cost could potentially be significantly greater than estimated and is very unlikely to be less than \$1,400/ton. The cost incurred by the SCP Cooperating PRP Group (Group) to dispose of 15 cu. yd. of sludge material during the IDW removal program completed several years ago was \$2,300/ton. This material was disposed of at the Deer Park facility, which at that time provided the lowest cost.

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SAFETY-KLEEN (DEER PARK), INC.
2027 Battleground Road -PO Box 609
Deer Park, TX 77536
Phone: 281/930-2300 - Fax: 281/930-2334
EPA ID# TXD055141378

Preliminary Proposal

To: Stuart Mitchell

From: Elizabeth Shellabarger

Date: March 5, 2001

Stream Name: PCB contaminated Soil/Sludge

Pricing:
Bulk/Repack: $1.00 - $1.06 /lb
Non-Bulk (drums): $1.12/lb
(waste profiles in bulk are considered on a case by case basis)

Elemental (metal/halogens) concentrations exceeding normal facility acceptance levels are accepted on a case by case basis and may warrant surcharges.

This proposal is valid for 30 days and is contingent upon the receipt and technical acceptance of a Material Profile properly characterizing the waste, a representative sample (if required), and acceptable credit and contractual terms. For all streams requiring a sample, a Waste Acceptance Analytical Fee of $550.00 applies. All state fees apply.

Please contact me at (281) 930-2337 with any questions regarding this proposal.

safety-kleen®

March 2, 2001

TRANSPORTATION PROPOSAL

Customer No.:
Effective Date: 03-02-01

Stuart Mitchell
GOLDER ASSOCIATES
1951 Old Cuthbert Road, Suite 301
Cherry Hill, NJ 08034

Dear Mr. Mitchell:

Thank you for your interest in Safety-Kleen (Deer Park), Inc. providing your transportation needs. We are pleased to offer the following proposal for your review.

PICK UP LOCATION	DELIVERY LOCATION
Cherry Hill, NJ 08034	S-K(Deer Park), Inc. 2027 Battleground Road Deer Park, TX 77536

Equipment Type	Trip Rate	Free Time (hours)	Demurrage per Hour (loading)	Daily Rental Charges
Tank Trailer, Vacuum Trailer, Vacuum Box, Open Top Bin, or Closed Top Bin	$ 5100.00	1 0-Vacuum Trailers Only	$ 70.00	$ 175.00/Day (Tank/Vacuum Trailer) $ 75.00/Day (Vacuum Box) $ 12.00/Day (Open Top Bin) $ 16.00/Day (Closed Top Bin)
Auger Trailer	$ .00	0	$ 70.00	$ 250.00/Day
Box Van, Flat Bed, or End Dump	$ 4200.00	1	$ 70.00	$ 75.00/Day (Box Van & Flat Bed) $ 125.00/Day (End Dump)

Other Charges:

Fuel Surcharge	approx. $75.00 (depending on going rates)
Equipment Spotting:	Equal to Trip Rate
Bin Liners:	$ 50.00/Liner
Hoses (2 x 20' included):	$ 30.00/Each additional 20'

Rinse Out Charges:

Bulk Liquid Material	Per Waste Stream Quote	
Bulk Solid Material:	Standard	$ 150.00
	Non-Standard (heavy residue)	$ 300.00
	Heels	Case By Case

S-K (Deer Park), Inc. warrants and represents that the truck rinseouts it performs will render the truck "RCRA empty" and suitable for future use in waste-hauling service. No other representation and/or warranty is made. The rinse outs performed will not render the trucks suitable for the hauling of any product and are not sufficient to maintain product purity and integrity. Offloading demurrage may be charged for non-conforming loads on a case-by-case basis.

If you have any questions, please call me at (~~713~~ 281) 930-2337.

Sincerely,

Elizabeth Shellabarger

Elizabeth Shellabarger
Customer Service Representative

Elemental Adders/Surcharges Table

ELEMENT	LEVEL 1 Concentration (ppm)	LEVEL 1 Surcharge (per pound)		LEVEL 2 Concentration (ppm)	LEVEL 2 Surcharge (per pound)
Metals - Group A:	*Problem metals, especially at NJ & TX, due to wet scrubber systems & water discharge permit.*				
Antimony	1,000 - 3,000	$0.04	Sb	3,001 - 10,000	$0.10
Arsenic	50 - 600	$0.04	As	601 - 2,000	$0.10
Beryllium	20 - 300	$0.04	Be	301 - 1,000	$0.10
Cadmium	75 - 225 ✓	$0.04	Cd	226 - 750	$0.10
Chromium VI	80 - 240 ✓	$0.04	Cr VI	241 - 800	$0.10
Mercury	5 - 15	$0.04	Hg	16 - 50 ✓	$0.10
Selenium	50 - 150	$0.04	Se	151 - 500	$0.10
Metals - Group B:	*Metals that pose less of a problem to meet facility permit criteria.*				
Barium	5,000 - 15,000	$0.03	Ba	15,001 - 50,000	$0.08
Chromium	1,200 - 3,600	$0.03	Cr	3,601 - 12,000	$0.08
Copper	1,000 - 3,000	$0.03	Cu	3,001 - 10,000	$0.08
Lead	1,500 - 4,500	$0.03	Pb	4,501 - 15,000	$0.08
Nickel	2,500 - 7,500	$0.03	Ni	7,501 - 25,000	$0.08
Silver	250 - 750	$0.03	Ag	751 - 2,500	$0.08
Thallium	300 - 900	$0.03	Tl	901 - 3,000	$0.08
Vanadium	1,200 - 3,600	$0.03	V	3,601 - 12,000	$0.08
Zinc	1,000 - 24,900	$0.03	Zn	24,901 - 83,000	$0.08
Alkali Metals:	*Metals that degrade refractory brick.*				
Lithium	5,000 - 15,000	$0.05	Li	15,001 - 500,000	$0.05 / wt %
Potassium	5,000 - 15,000	$0.02	K	15,001 - 500,001	$0.02 / wt %
Sodium	5,000 - 15,000	$0.02	Na	15,001 - 500,000 ✓	$0.02 / wt %
Acid Formers-Soluble:	*Soluble salts requiring neutralization to meet the pH specification for water discharge/wet systems. Bromine & Iodine (exit gas opacity problem).*				
Bromine	1,000 - 3,000	$0.02	Br	3,001 - 10,000	$0.05
Chlorine - Dry*	50,000 - 200,000	$0.02	Cl	200,001 - 920,000	$0.004 / wt %
Chlorine - Wet*	50,000 - 200,000	$0.00	Cl	200,001 - 920,000	$0.001 / wt %
Iodine	500 - 1,500	$0.02	I	1,501 - 5,000	$0.05
Nitrogen	1,000 - 5,000	$0.02	N	5,001 - 25,000	$0.05
Acid Formers-Insoluble:	*Insoluble salts collected in dry baghouse system & in slugde tank of wet scrubber system. Fluorine (degradation affect on refractory)*				
Fluorine	1,000 - 10,000	$0.02	F	10,001 - 750,000	$0.012 / wt %
Phosphorous	1,000 - 100,000	$0.015 / wt %	P	100,001 - 900,000	$0.015 / wt %
Sulfur	5,000 - 150,000	$0.012 / wt %	S	150,001 - 500,000	$0.012 / wt %

*Note: DRY chlorine adders/surcharges applies to waste destined for processing at a dry scrubber/baghouse incinerator-KS & UT. WET applies to waste destined for processing at a wet scrubber/wet discharge incinerator - NJ & TX.

Metals (Group A, B) & Bromine, Iodine & Nitrogen: Adders/surcharges are NOT additive. The highest single adder/surcharge applies, e.g., 2,000 ppm Lead & 8 ppm Mercury would be $0.03/lb, not $0.06/lb.
Alkali Metals, Chlorine & Acid Formers (Insoluble): Addders/surcharges are calculated for each metal/element. They ARE ADDITIVE, because their impact is additive.

Surcharges above Level Two will be a function of the number of times the stream concentration must be halved to be under the Level Two limits. The additional charge will be the Level Two add/surcharge times the number of times the concentration was halved.

ONYX ENVIRONMENTAL SERVICES

ONYX

Price Quotation

March 6, 2001

Mr. Stuart Mitchell
Golder Associates
Cherry Hill, NJ 08034

Dear Mr. Mitchell :

Onyx Environmental Services is pleased to respond to your request for pricing with the following quotation.

Job Location: Carlstadt, NJ

Waste Material and Volume: 1) Approximately 2200 cubic yards of sludge/soil contaminated with PCBs and VOCs; 2) Approximately 15,000 gallons of PCB contaminated ground water

Waste Code(s): To be determined

Services Provided: Transportation and Disposal

Onyx Disposal Facilities:

Onyx-CWM Port Arthur (PTA)
Post Office Box 2563
Highway 73, 3.5 miles west of Taylor's Bayou
Port Arthur, Texas 77643 (mail) 77640 (UPS)
Phone: (409) 736-2821
USEPA ID# TXD000838896
Receiving Hours: 7:00 AM – 4:00 PM, Monday through Friday
CERCLA approved, RCRA and TSCA permitted

Estimated Job Start: 2002

Pricing:

DISPOSAL

PCB Contaminated Ground Water Disposal via high temperature incineration	$0.14 per pound, $2000 minimum per load
Stream Qualifications: <3000 Btu, solids <5%, viscosity <100cps, chlorine <10%, Na/K <1%(combined), Br/I/F <1%(combined), sulfur <5%, pH 4-10	
RCRA/TSCA Contaminated Soil Disposal via high temperature incineration	$0.22 per pound, $4000 minimum per load
Stream Qualifications: <2000 Btu, flash point >140°F, sulfur <5%, chlorine <5%, Na/K <1%(combined), Br/F/I <1%(combined), must pass paint filter test, debris must be <10% of the load and meet the debris specifications outlined below.	

RCRA/TSCA Contaminated Soil/Sludge Disposal via high temperature incineration	$0.50 per pound, $4000 minimum per load
Stream Qualifications: >5000 Btu, flash point >100°F, <75% free liquid, chlorine <25%, Na/K <1%(combined), Br/K/I <1%(combined), sulfur <5%, debris must be <25% of the load and must meet the debris specifications outlined below.	

TRANSPORTATION
Via Truck

Roll-off Box:	$5850.00 per load;17.5 ton payload
Drop Charge:	$2925.00 per box; applies to roll-offs if not live loaded; 2 boxes per trip
Daily rental:	$11.50 per box per day
Demurrage:	$80.00/hour (2 hours free loading)

TAXES

Texas:	$20.00/ton RCRA out-of –state

Qualifications:

This quotation is valid for thirty (30) days. Onyx-CWM-Port Arthur will invoice upon receipt of the waste. Terms are net thirty (30) days.

Waste Approval Fees: $500.00 per waste stream; Waived if waste is shipped to an Onyx facility

A completed waste profile sheet and sample must be submitted and approved prior to waste scheduling. All samples will be sent to the Port Arthur lab for analysis. The waste profile sheet and representative sample should be sent to:

Onyx-CWM-Port Arthur
Highway 73, 3.5 miles west of Taylor's Bayou
Port Arthur, TX 77640 (UPS)
Attn: Sales Sample

Waste Criteria:

All bulk solid waste must pass the paint filter test, be non-tacky and exhibit negative flammability potential. Debris requirements follow for PTA.

PTA: This facility has a dual-stage shredder system and can manage a wide variety of debris including the following:

Wood	Boards, poles, logs, stumps, etc. – maximum size is 6"x6"x3 feet.
	Plywood, paneling, chipboard, etc. – maximum size is 4 feet x 4 feet.
Concrete	Cement, stone, cinder blocks, etc. – maximum size is 6"x6"x6". **Waste may not contain rebar.**
Metal **Rebar is not acceptable**	Brand iron, flat iron, angle iron, etc. – maximum thickness is 1/8". Cross section must be 2" or smaller. Pieces can be no longer than two feet.
	Pipe, conduit, tubing, etc. – maximum thickness is 1/8". Pieces can be no larger than 1 foot x 1 foot.
	Sheet metal, ductwork, etc. – maximum thickness is 1/8". Pieces can be no larger than 1 foot x 1 foot.
	Drums, pails, cans, etc. – sizes up to 55 gallons will be acceptable. If crushed, the drums may not be flattened from the top to the bottom.

Glass	Bottles, jars, insulators, etc. – not to exceed 5% by weight in bulk packages.
Miscellaneous	Wire, cable, etc. – maximum length is 2 feet. Maximum diameters if ½". Wire coils, armatures, etc., should be cut so individual wire strands are no longer than 2 feet.
	Hoses, etc. – maximum length is 2 feet. Maximum diameter is 6".
	Rope, line, string, etc. – pieces should be no larger than 2 feet x 2 feet, unless shipped in burnable drums.
	Plastic sheeting, etc. – pieces should be no larger than 2 feet x 2 feet, unless shipped in a burnable drum.
	Plastic tubing – maximum length is 2 feet. Maximum diameter is 2", unless shipped in a burnable drum.
	Plastic drums – crush or cut in half length-wise.

Scheduling:

Scheduling is subject to site availability. For this project, PTA can receive 12-15 loads per week. PTA receives roll-off boxes.

Thank you for the opportunity to submit this proposal. Please call me at (225) 293-4635 if you have any questions.

Sincerely,

Allison T Wisener

Allison T. Wisener
Thermal Event Manager
Thermal Operations

Cc: Pat O'Shea-Thermal Product Manager
MaryJane Reilly-Account Manager